FIGURE 1
(Prior Art)

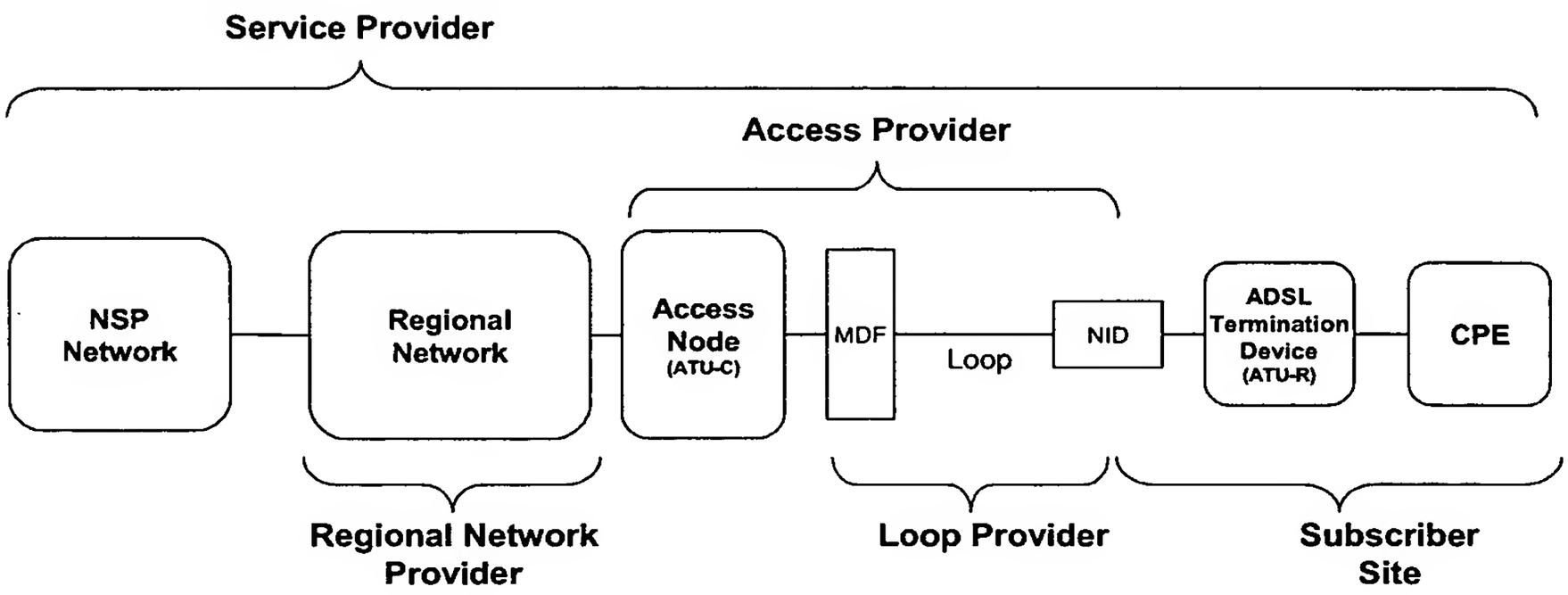


FIGURE 2
(Prior Art)

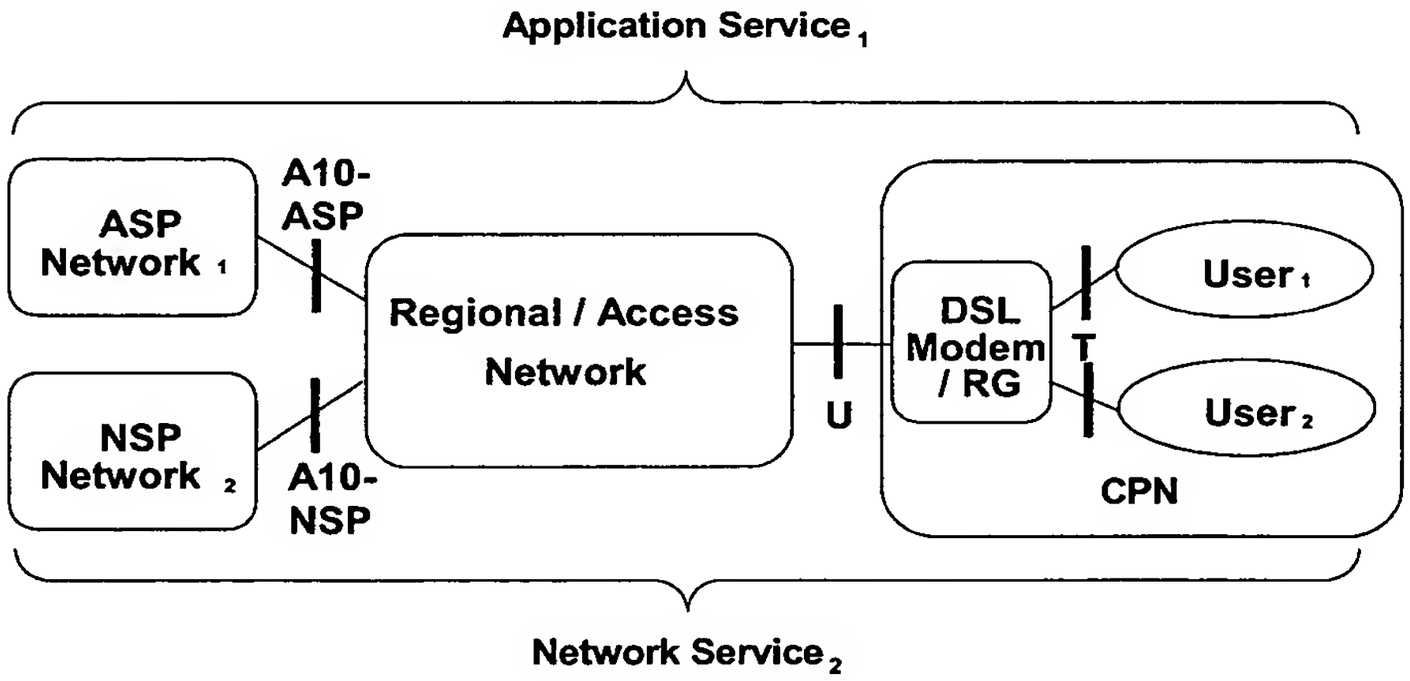


FIGURE 3
(Prior Art)

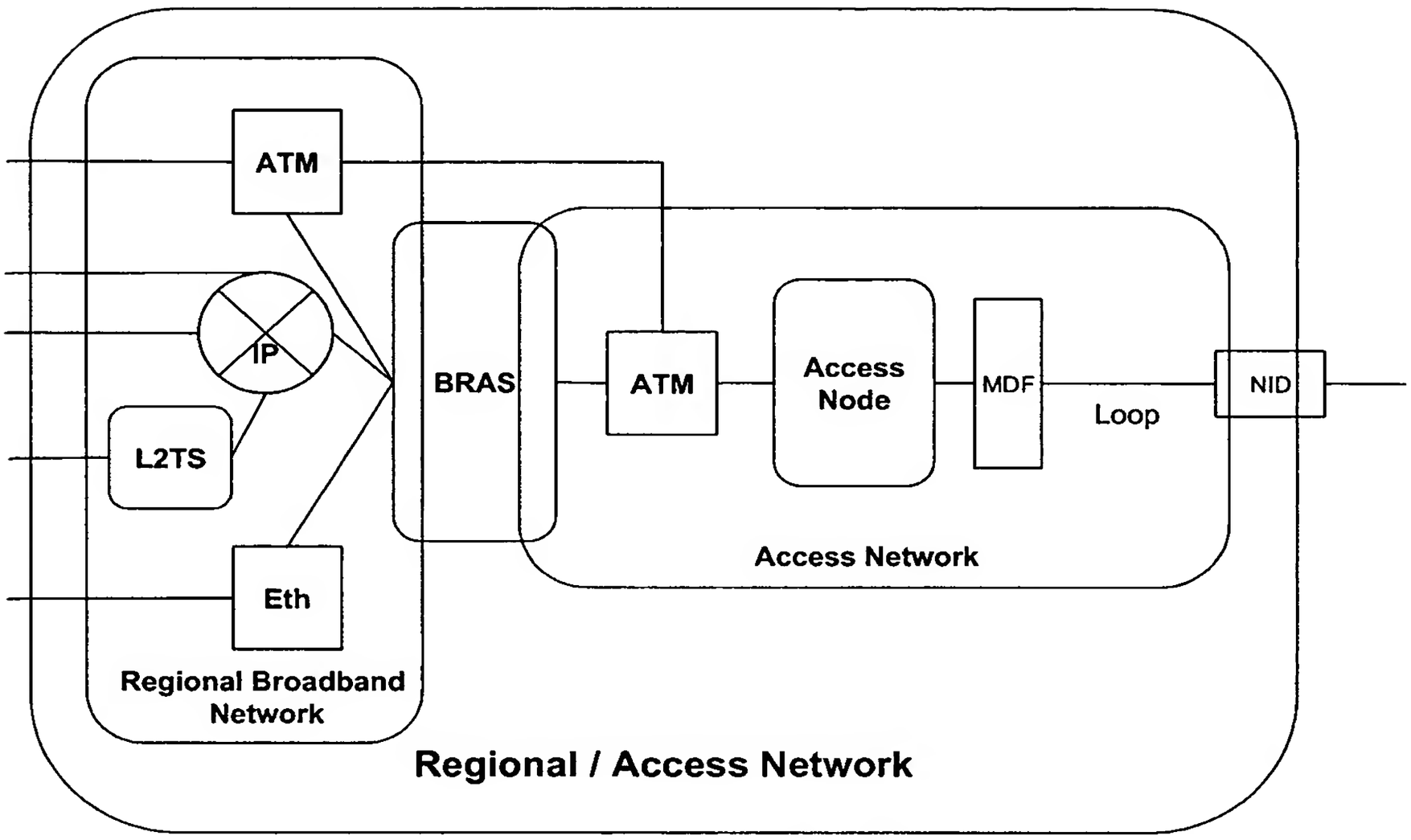


FIGURE 4
(Prior Art)

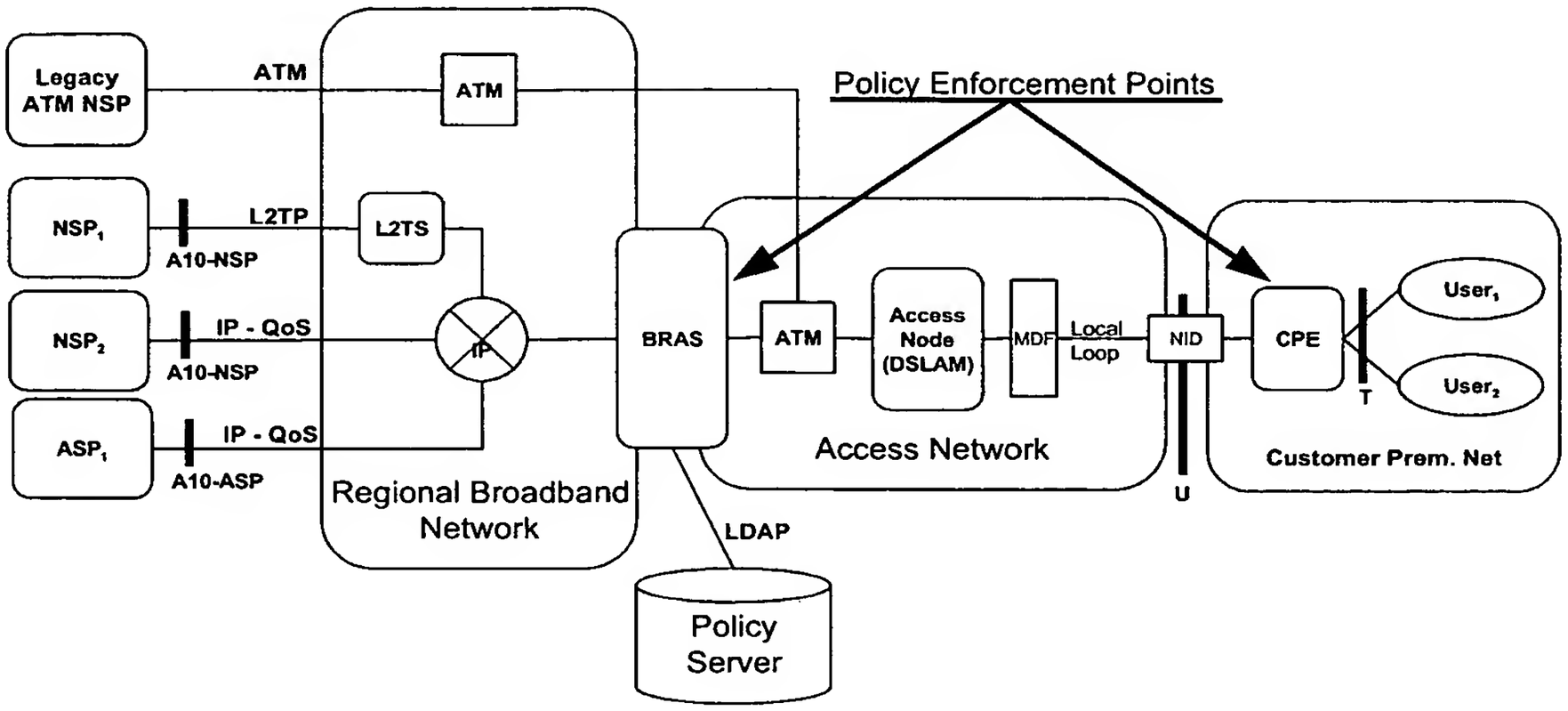


FIGURE 5

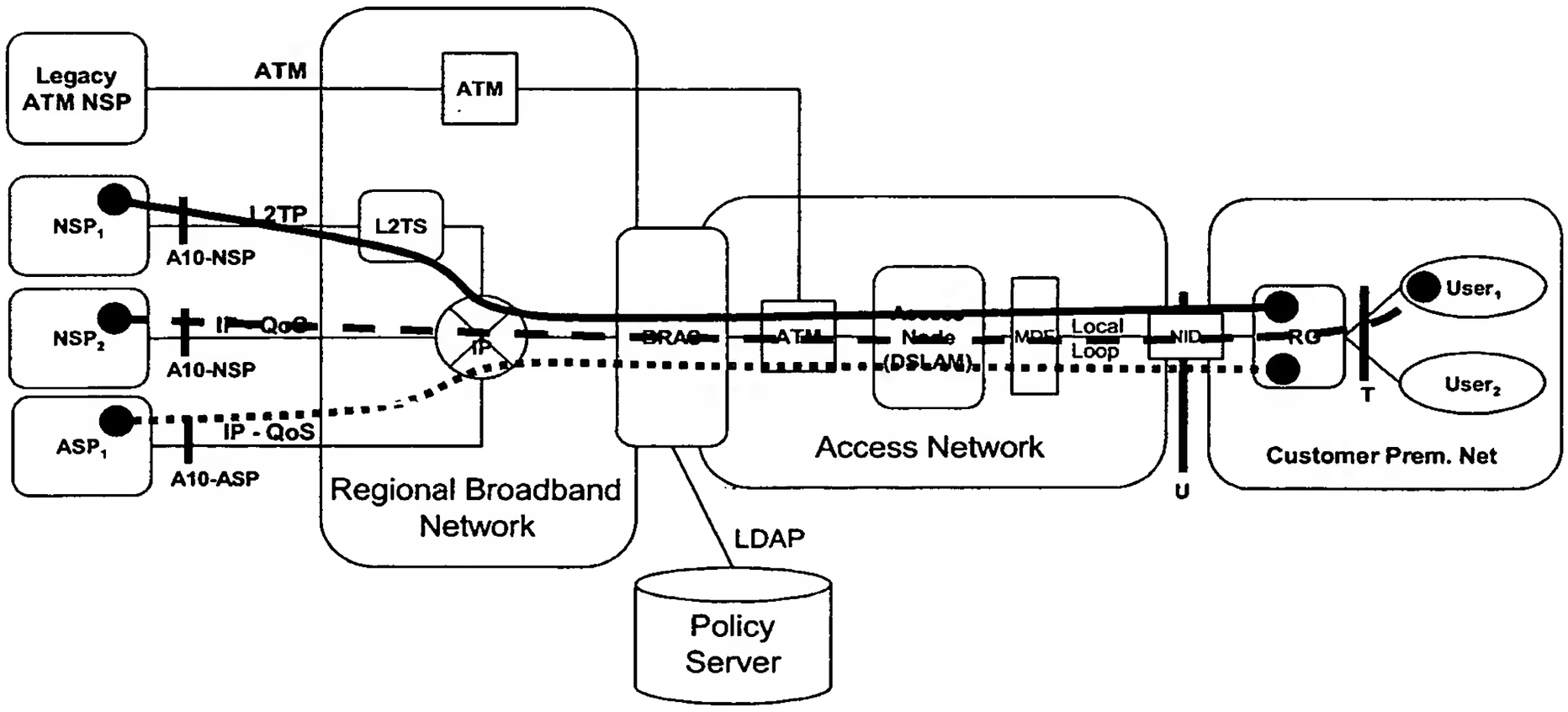


FIGURE 6

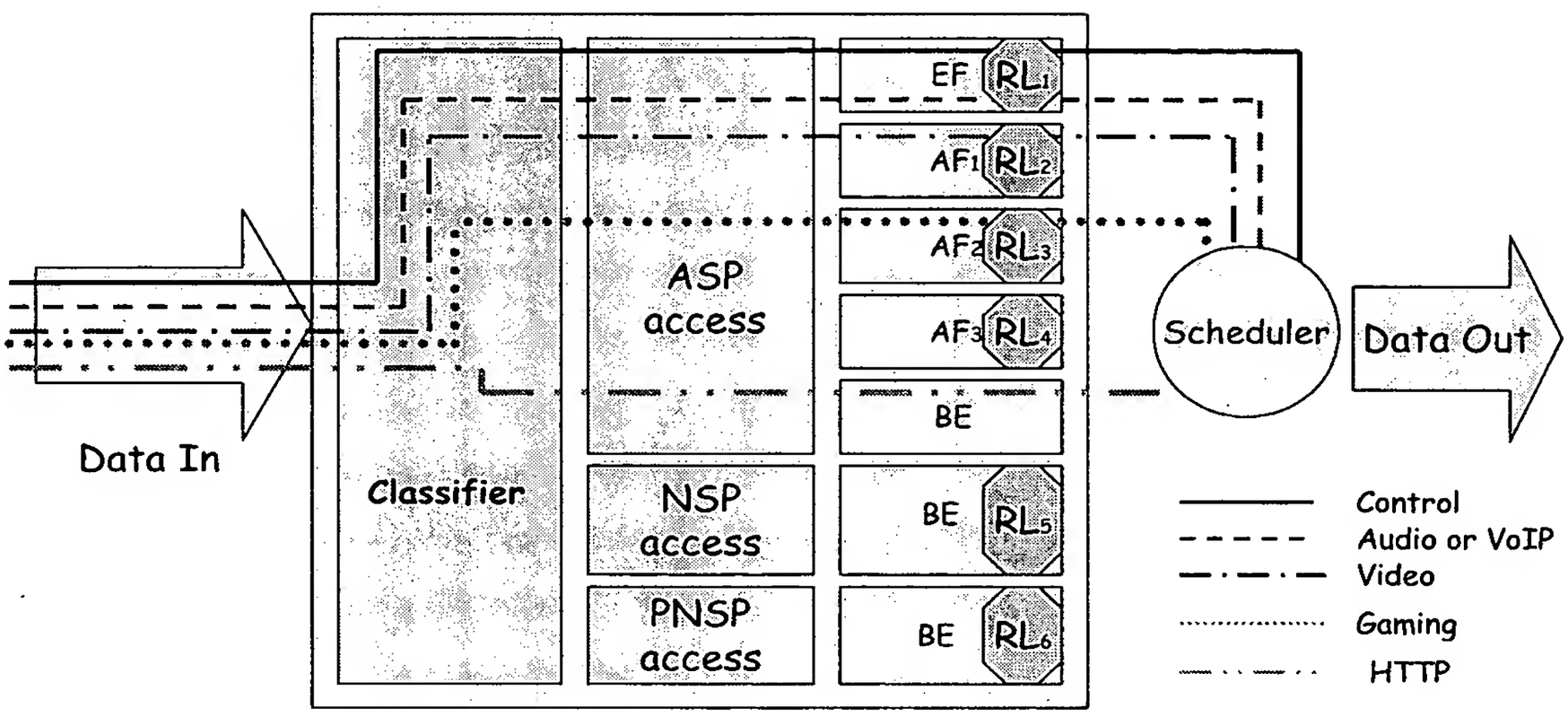


FIGURE 7

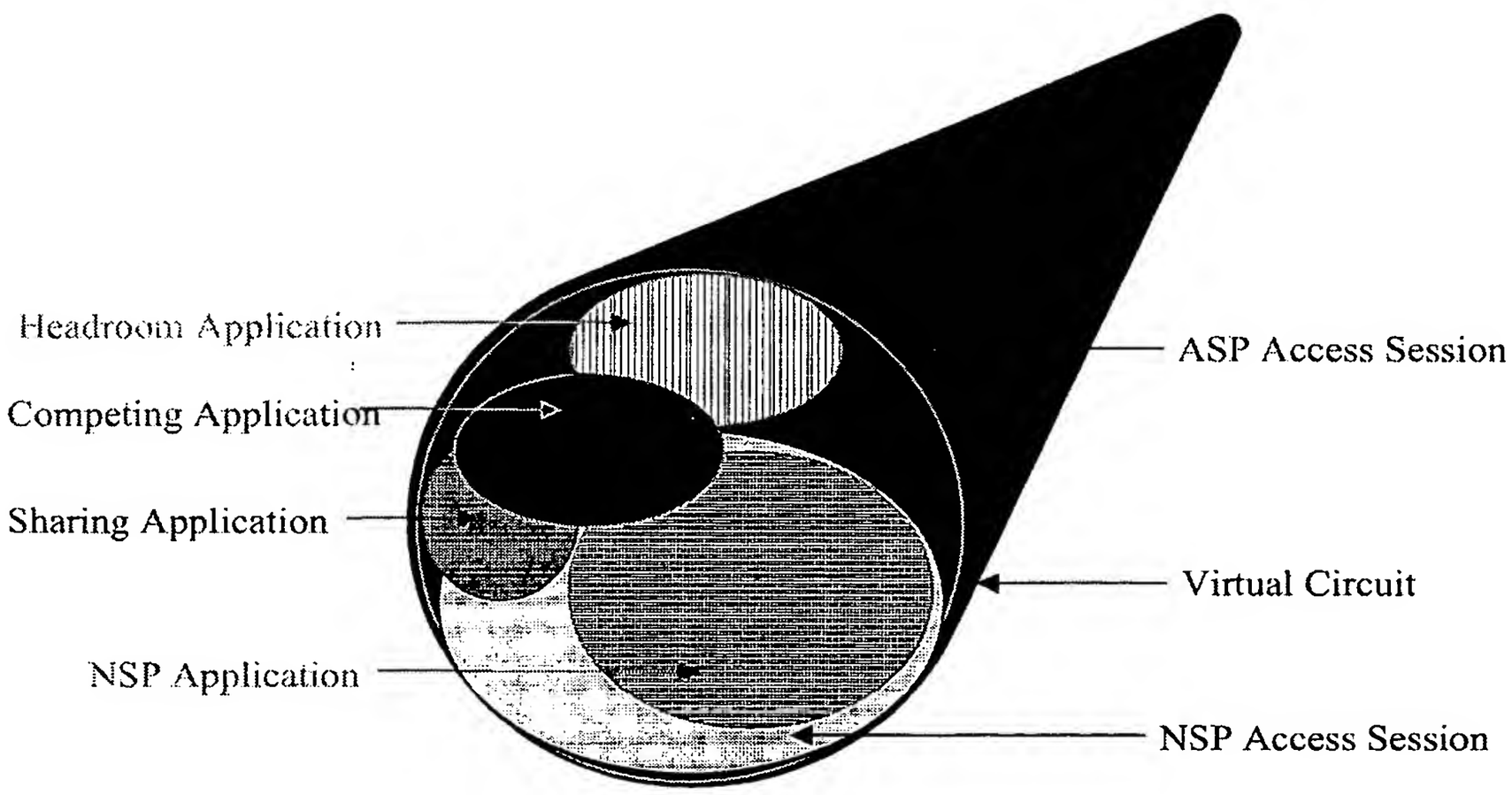


FIGURE 8

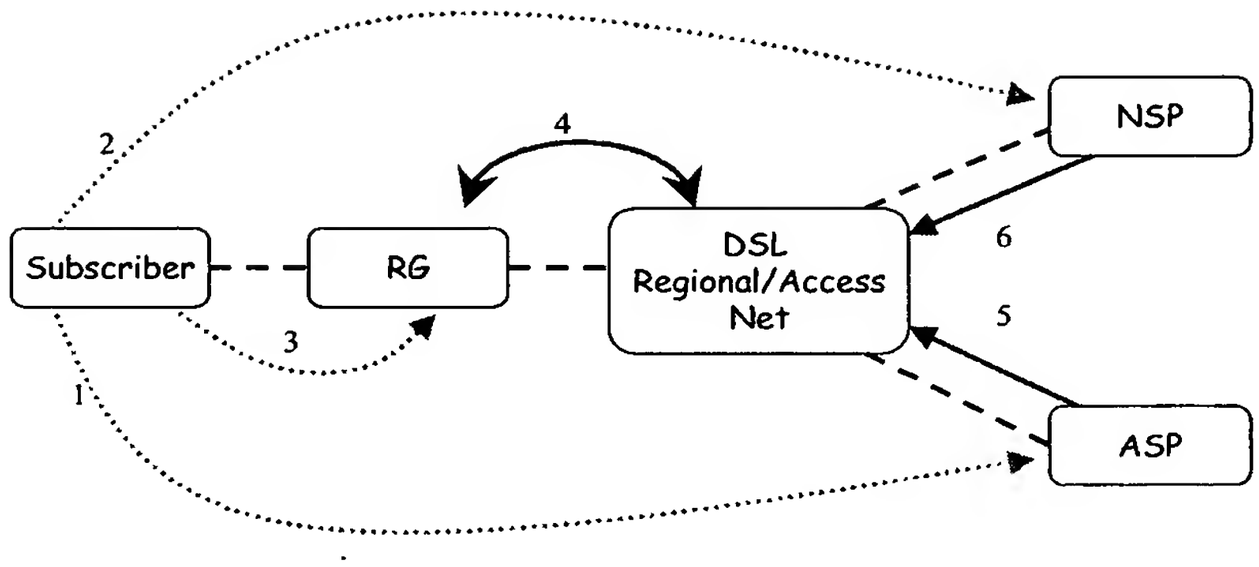


FIGURE 9

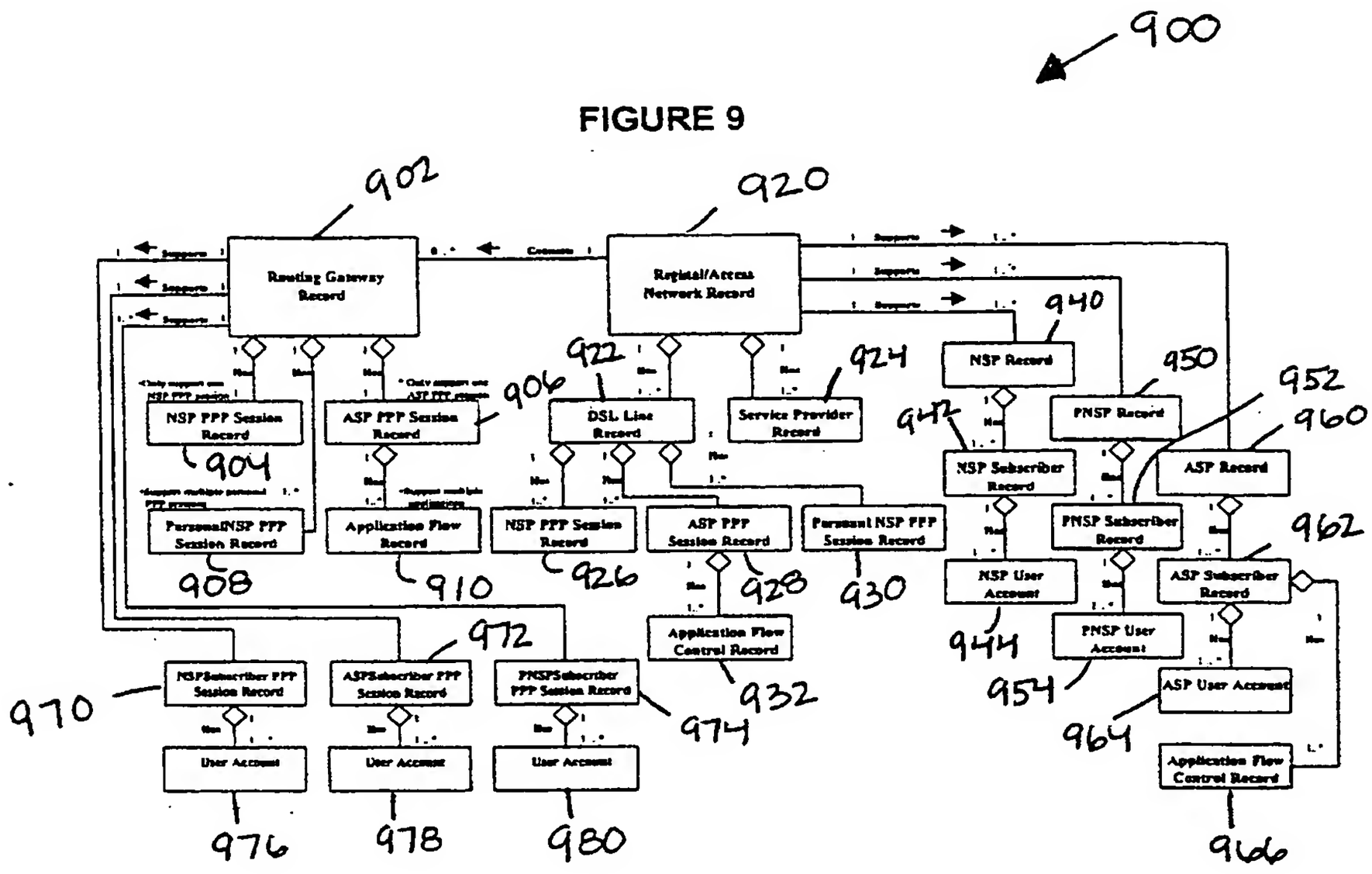

900
902
920
Routing Gateway Record
Regional/Access Network Record
940
NSP Record
950
952
960
PNSP Record
ASP Record
922
924
906
DSL Line Record
Service Provider Record
947
NSP Subscriber Record
NSP PPP Session Record
904
ASP PPP Session Record
PersonalNSP PPP Session Record
908
Application Flow Record
910
NSP PPP Session Record
926
ASP PPP Session Record
928
Personal NSP PPP Session Record
930
PNSP Subscriber Record
962
NSP User Account
944
ASP Subscriber Record
PNSP User Account
954
ASP User Account
964
Application Flow Control Record
932
966
970
NSPSubscriber PPP Session Record
ASPSubscriber PPP Session Record
972
PNSPSubscriber PPP Session Record
974
User Account
976
User Account
978
User Account
980

FIGURE 10

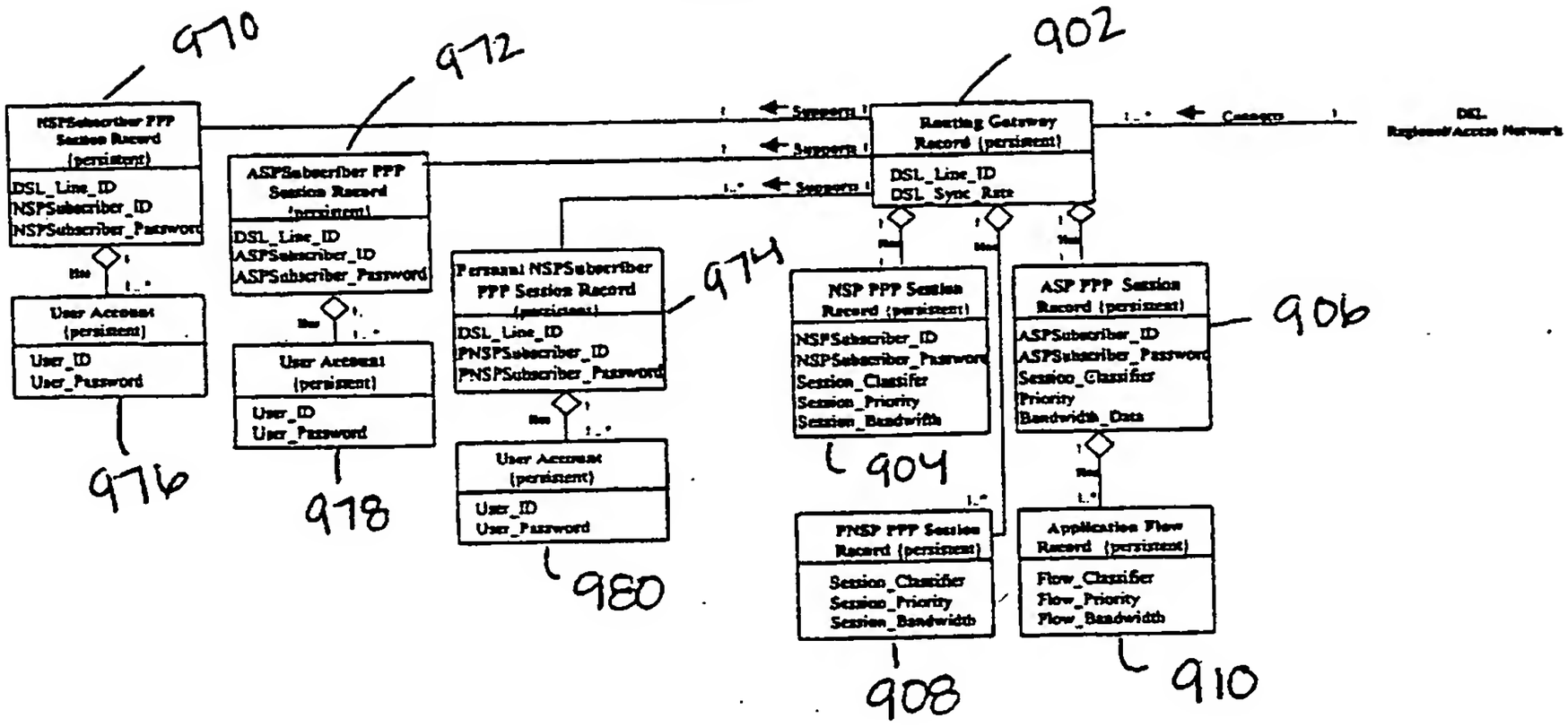

970
972
902
NSPSubscriber PPP Session Record (persistent)
DSL_Line_ID
NSPSubscriber_ID
NSPSubscriber_Password
ASPSubscriber PPP Session Record (persistent)
DSL_Line_ID
ASPSubscriber_ID
ASPSubscriber_Password
Routing Gateway Record (persistent)
DSL_Line_ID
DSL_Sync_Rate
DSL Regional Access Network
Supports
Connects
Has
User Account (persistent)
User_ID
User_Password
976
User Account (persistent)
User_ID
User_Password
978
Personal NSPSubscriber PPP Session Record (persistent)
974
DSL_Line_ID
PNSPSubscriber_ID
PNSPSubscriber_Password
User Account (persistent)
User_ID
User_Password
980
NSP PPP Session Record (persistent)
NSPSubscriber_ID
NSPSubscriber_Password
Session_Classifer
Session_Priority
Session_Bandwidth
904
ASP PPP Session Record (persistent)
906
ASPSubscriber_ID
ASPSubscriber_Password
Session_Classifer
Priority
Bandwidth_Data
PNSP PPP Session Record (persistent)
Session_Classifer
Session_Priority
Session_Bandwidth
908
Application Flow Record (persistent)
Flow_Classifer
Flow_Priority
Flow_Bandwidth
910

FIGURE 11

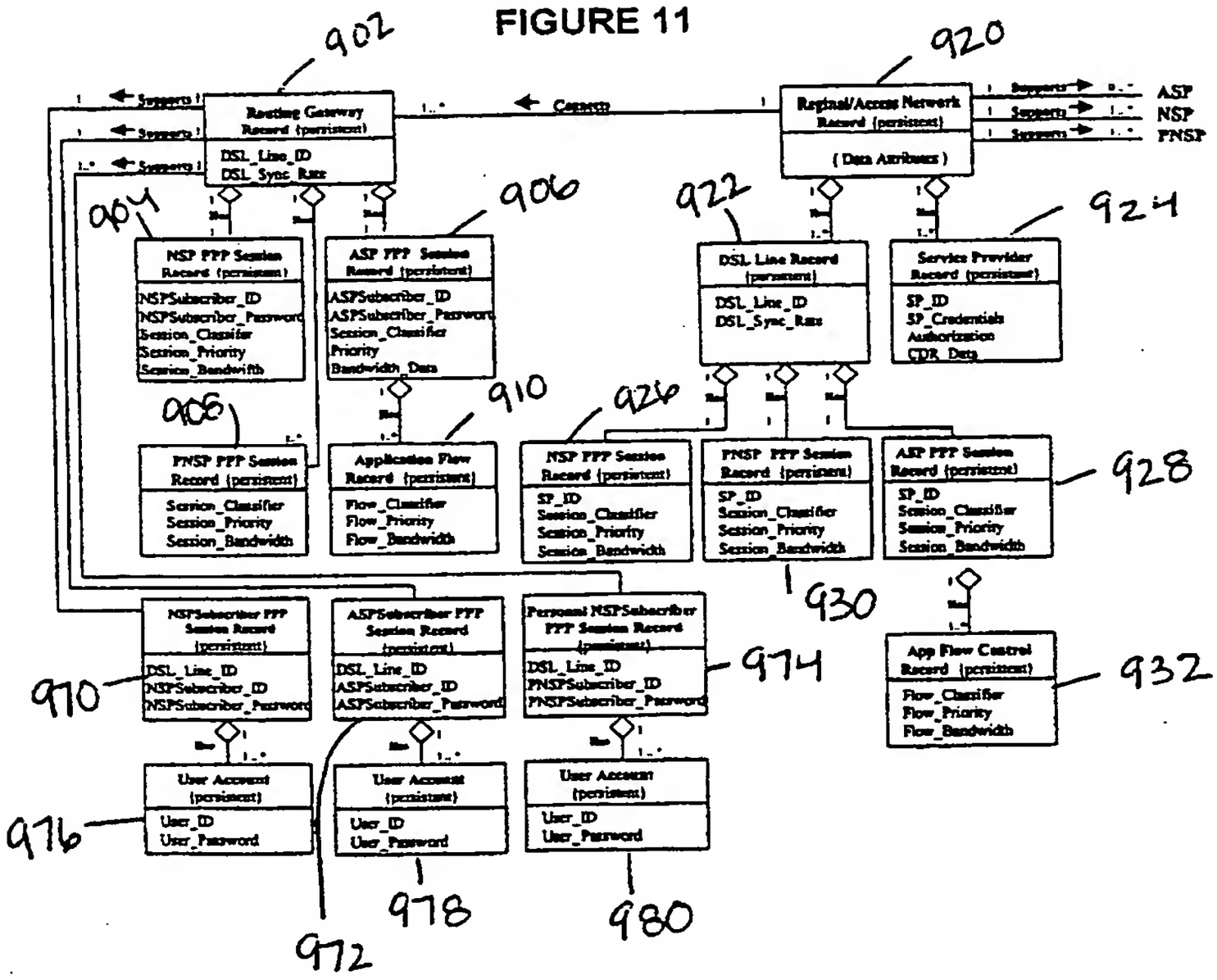

902
Routing Gateway
Record (persistent)
DSL_Line_ID
DSL_Sync_Rate
Supports
Connects
920
Regional/Access Network
Record (persistent)
(Data Attributes)
ASP
NSP
PNSP
904
906
922
924
NSP PPP Session
Record (persistent)
NSPSubscriber_ID
NSPSubscriber_Password
Session_Classifier
Session_Priority
Session_Bandwith
ASP PPP Session
Record (persistent)
ASPSubscriber_ID
ASPSubscriber_Password
Session_Classifier
Priority
Bandwidth_Data
DSL Line Record
(persistent)
DSL_Line_ID
DSL_Sync_Rate
Service Provider
Record (persistent)
SP_ID
SP_Credentials
Authorization
CDR_Data
908
910
926
928
PNSP PPP Session
Record (persistent)
Session_Classifier
Session_Priority
Session_Bandwidth
Application Flow
Record (persistent)
Flow_Classifier
Flow_Priority
Flow_Bandwidth
NSP PPP Session
Record (persistent)
SP_ID
Session_Classifier
Session_Priority
Session_Bandwidth
PNSP PPP Session
Record (persistent)
SP_ID
Session_Classifier
Session_Priority
Session_Bandwidth
ASP PPP Session
Record (persistent)
SP_ID
Session_Classifier
Session_Priority
Session_Bandwidth
930
NSPSubscriber PPP
Session Record
(persistent)
DSL_Line_ID
NSPSubscriber_ID
NSPSubscriber_Password
ASPSubscriber PPP
Session Record
(persistent)
DSL_Line_ID
ASPSubscriber_ID
ASPSubscriber_Password
Personal NSPSubscriber
PPP Session Record
(persistent)
DSL_Line_ID
PNSPSubscriber_ID
PNSPSubscriber_Password
974
App Flow Control
Record (persistent)
Flow_Classifier
Flow_Priority
Flow_Bandwidth
932
910
User Account
(persistent)
User_ID
User_Password
User Account
(persistent)
User_ID
User_Password
User Account
(persistent)
User_ID
User_Password
976
978
980
972

FIGURE 12

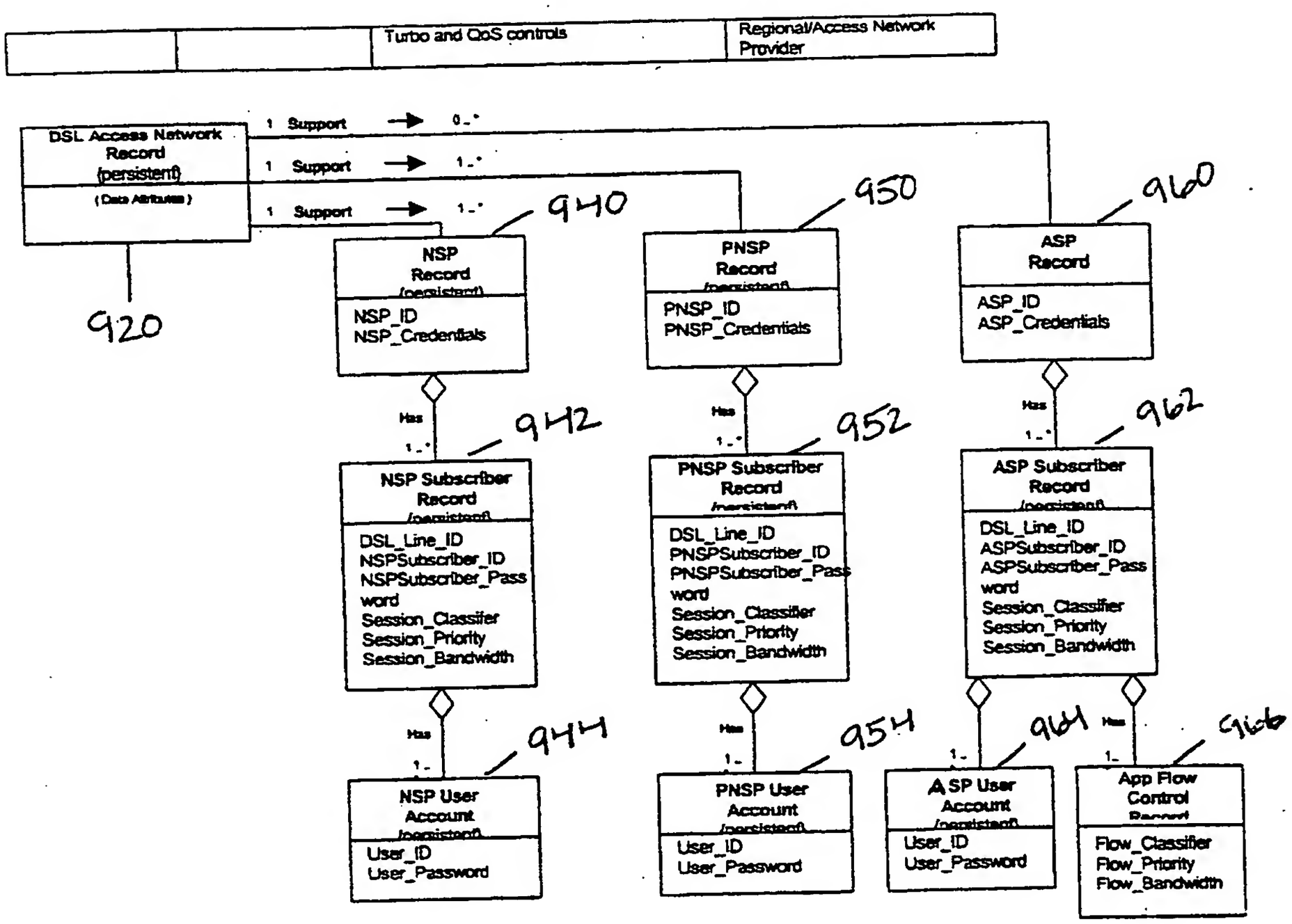

Turbo and QoS controls
Regional/Access Network Provider
DSL Access Network Record (persistent)
(Data Attributes)
1 Support 0..*
1 Support 1..*
1 Support 1..*
920
940
NSP Record (persistent)
NSP_ID
NSP_Credentials
950
PNSP Record (persistent)
PNSP_ID
PNSP_Credentials
960
ASP Record
ASP_ID
ASP_Credentials
Has 1..*
942
NSP Subscriber Record (persistent)
DSL_Line_ID
NSPSubscriber_ID
NSPSubscriber_Password
Session_Classifier
Session_Priority
Session_Bandwidth
952
PNSP Subscriber Record (persistent)
DSL_Line_ID
PNSPSubscriber_ID
PNSPSubscriber_Password
Session_Classifier
Session_Priority
Session_Bandwidth
962
ASP Subscriber Record (persistent)
DSL_Line_ID
ASPSubscriber_ID
ASPSubscriber_Password
Session_Classifier
Session_Priority
Session_Bandwidth
944
NSP User Account (persistent)
User_ID
User_Password
954
PNSP User Account (persistent)
User_ID
User_Password
964
ASP User Account (persistent)
User_ID
User_Password
966
App Flow Control Record
Flow_Classifier
Flow_Priority
Flow_Bandwidth

FIGURE 13

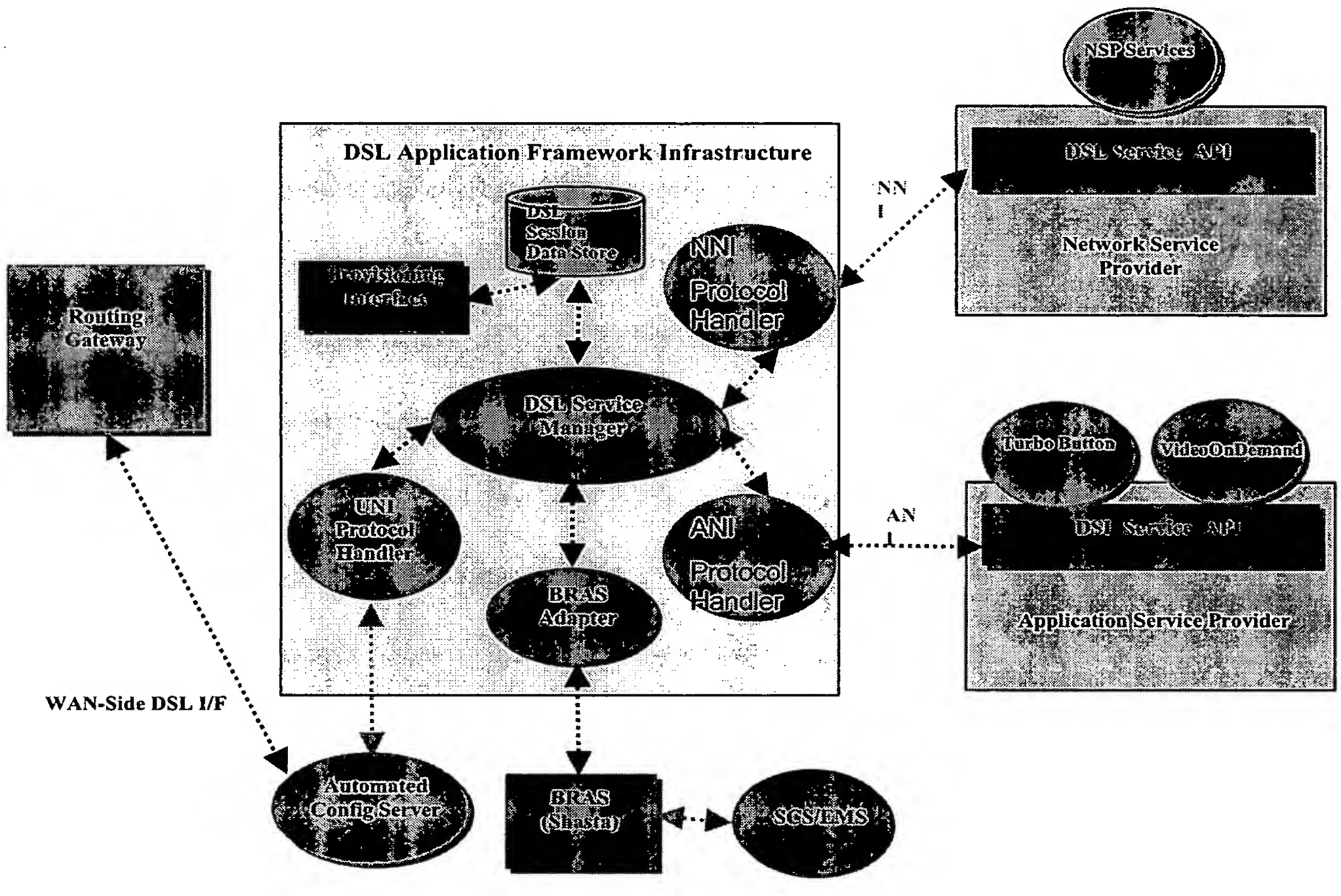

NSP Services
DSL Service API
Network Service Provider
NNI
DSL Application Framework Infrastructure
DSL Session Data Store
Provisioning Interface
NNI Protocol Handler
Routing Gateway
DSL Service Manager
UNI Protocol Handler
ANI Protocol Handler
BRAS Adapter
AN
I
Turbo Button
VideoOnDemand
DSL Service API
Application Service Provider
WAN-Side DSL I/F
Automated Config Server
BRAS (Shasta)
SCS/EMS

FIGURE 14

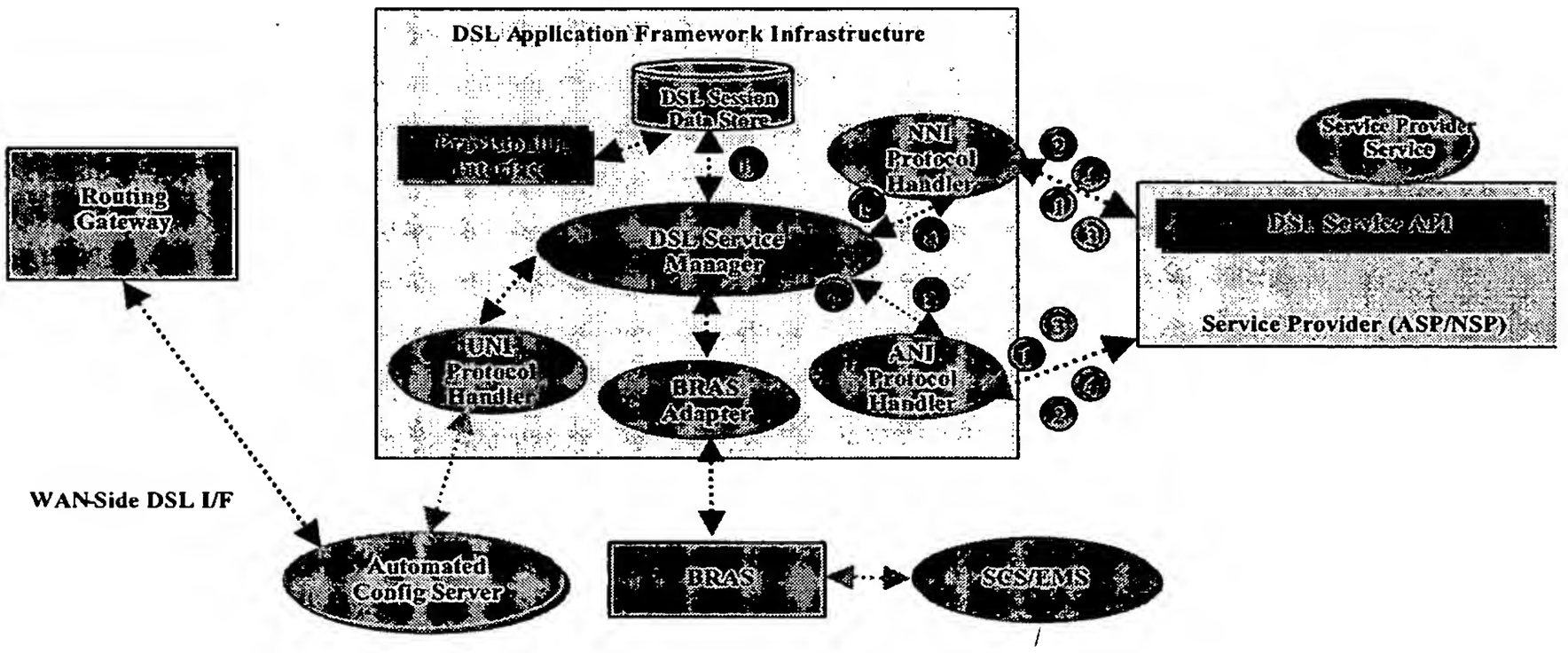


FIGURE 15

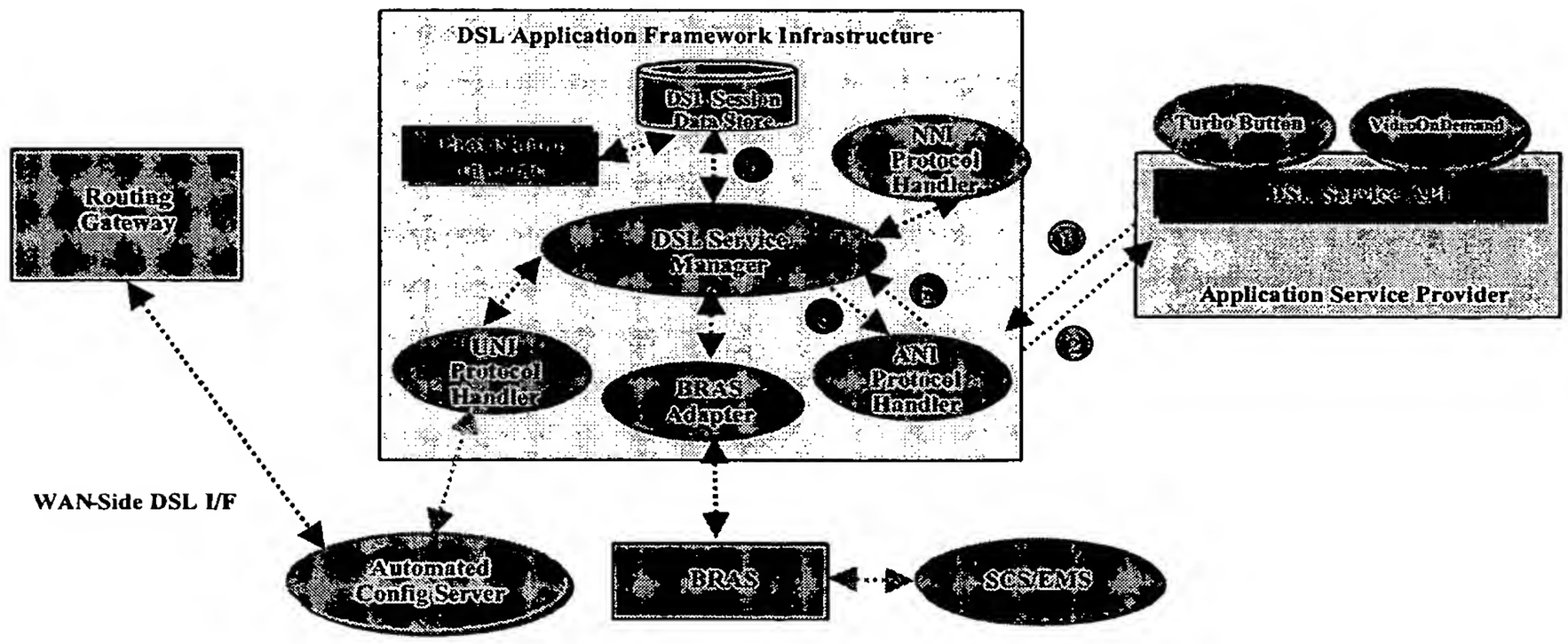


FIGURE 16

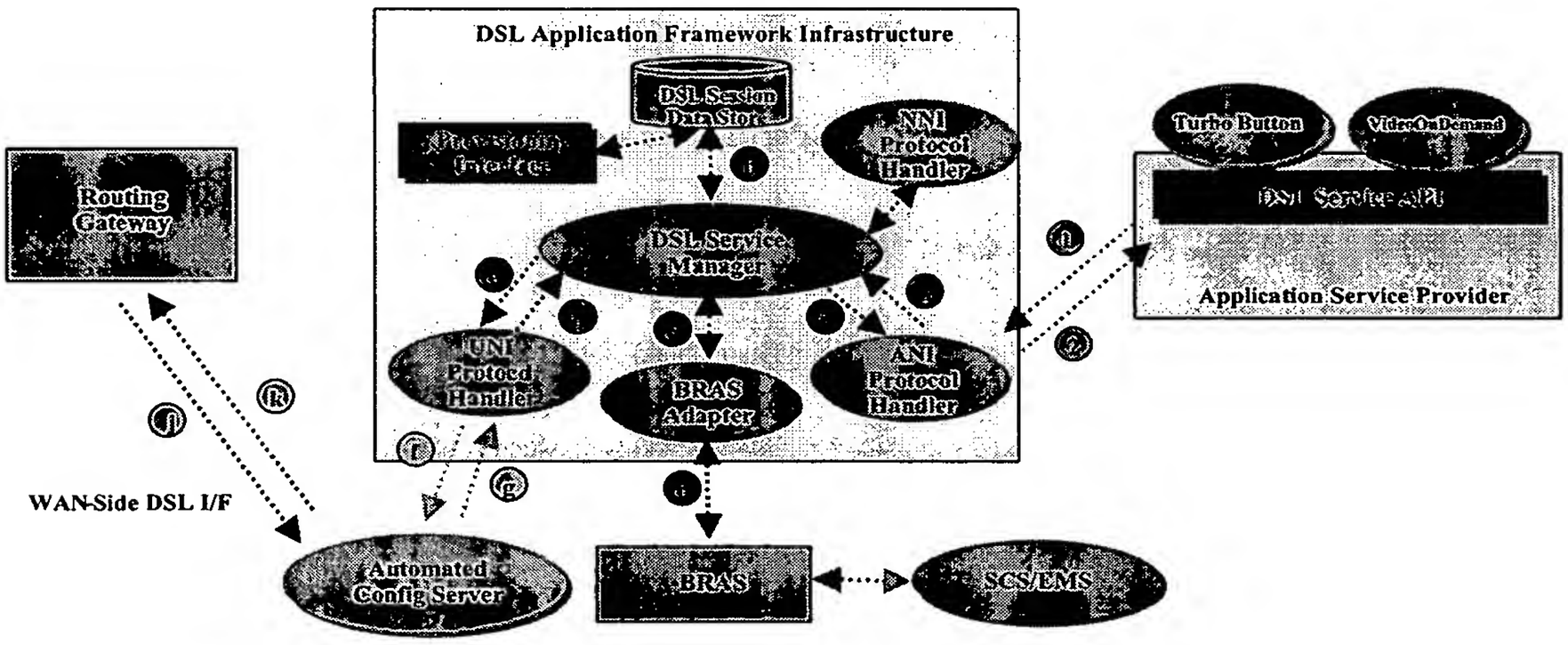


FIGURE 17

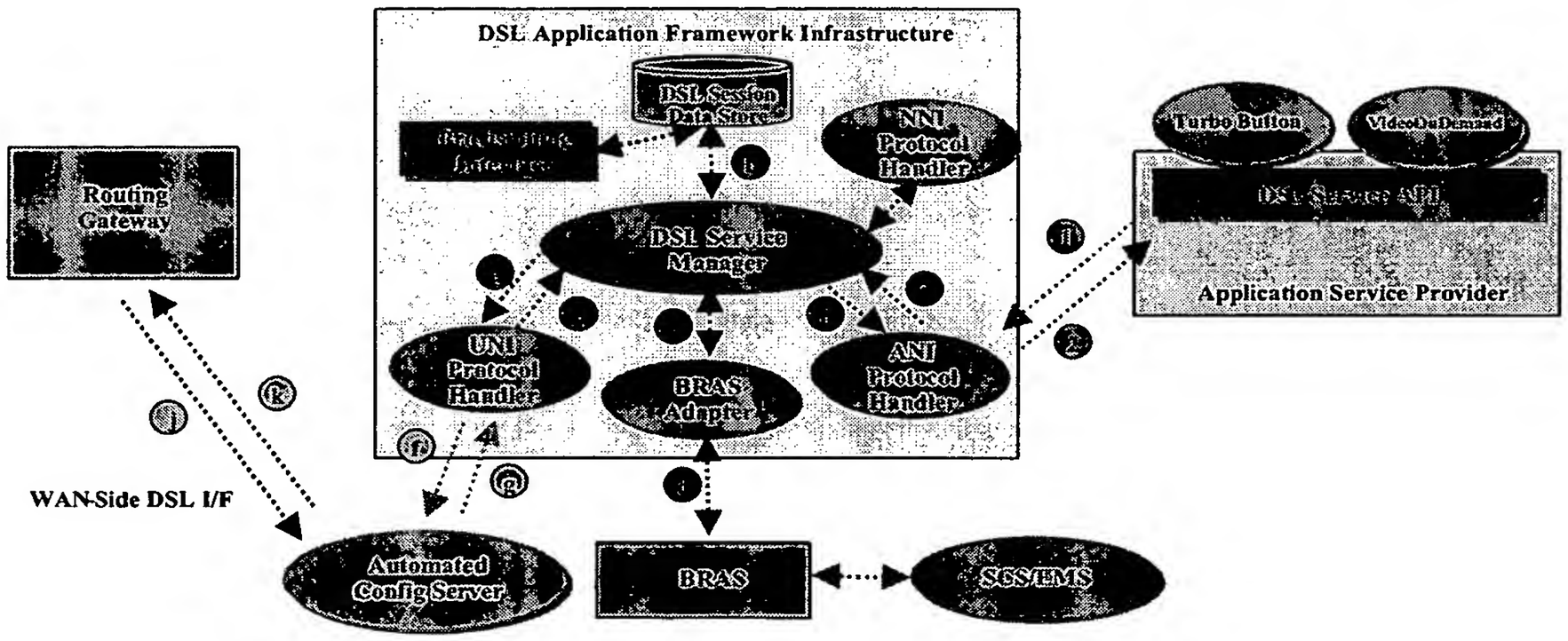


FIGURE 18

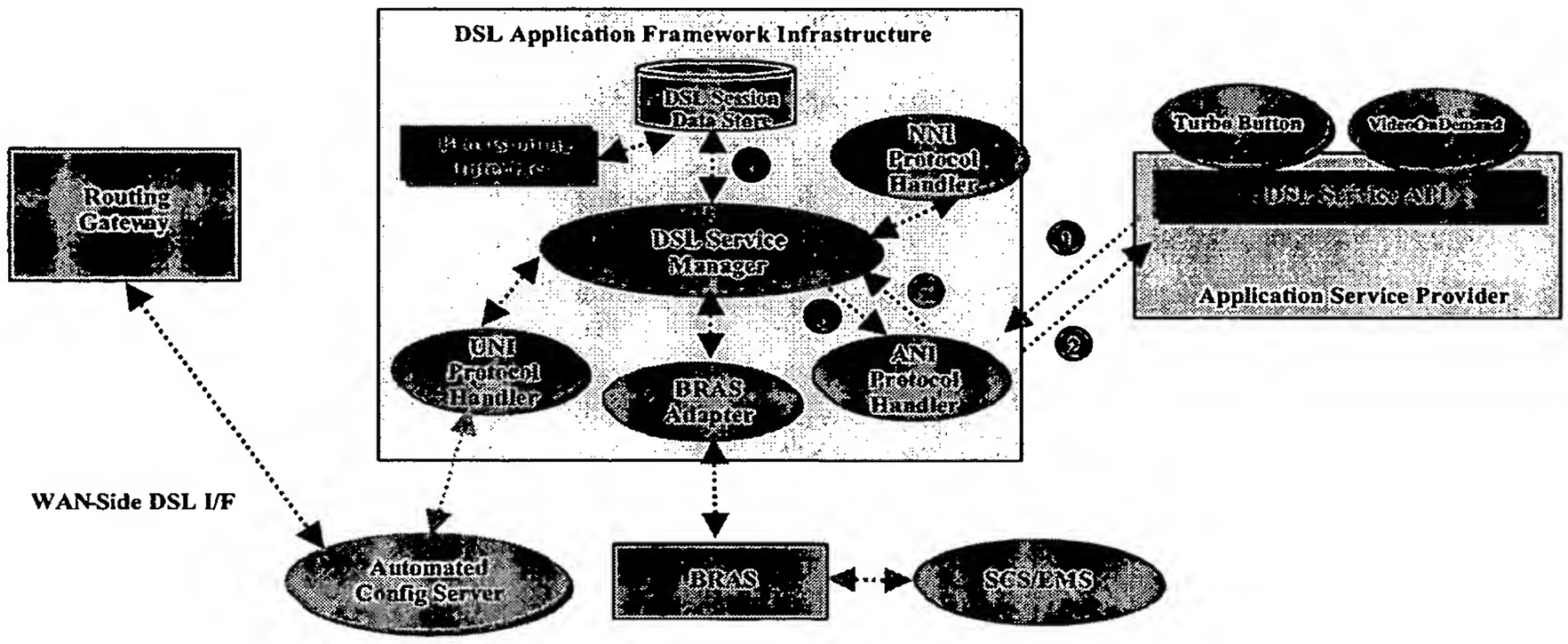


FIGURE 19

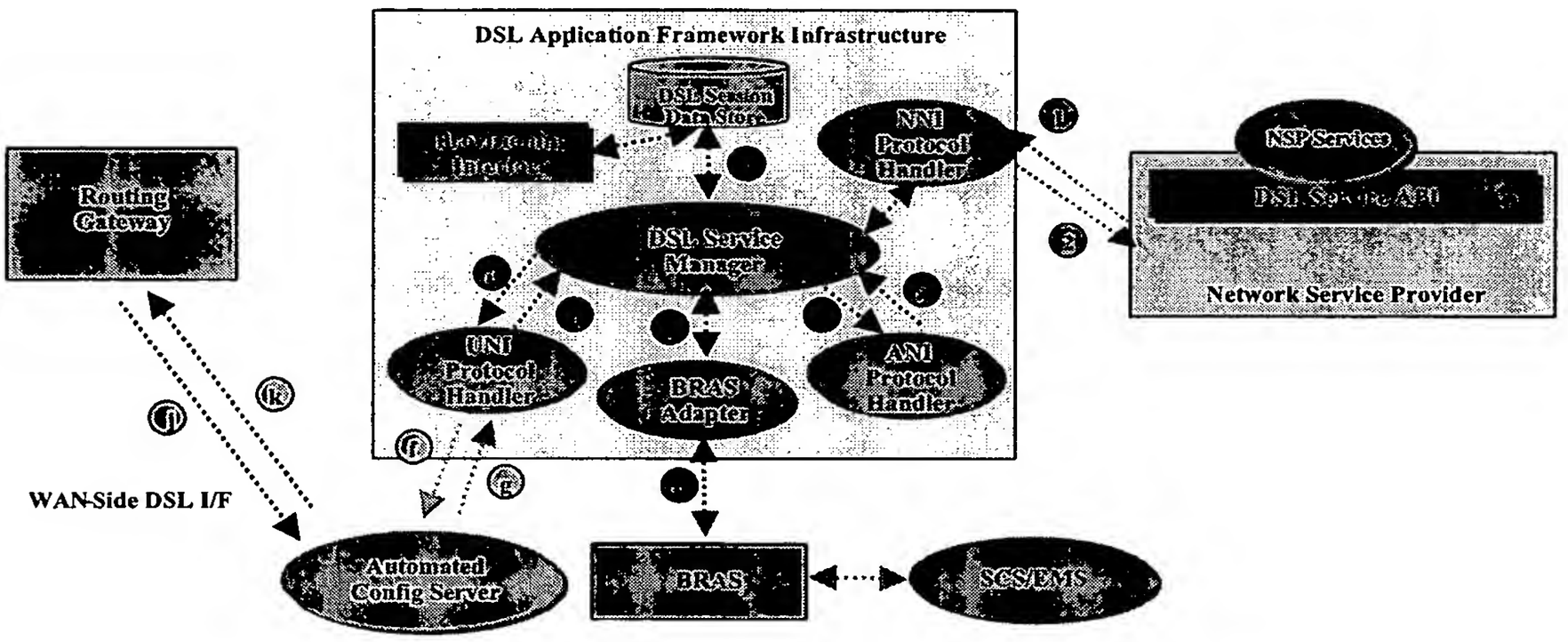


FIGURE 20

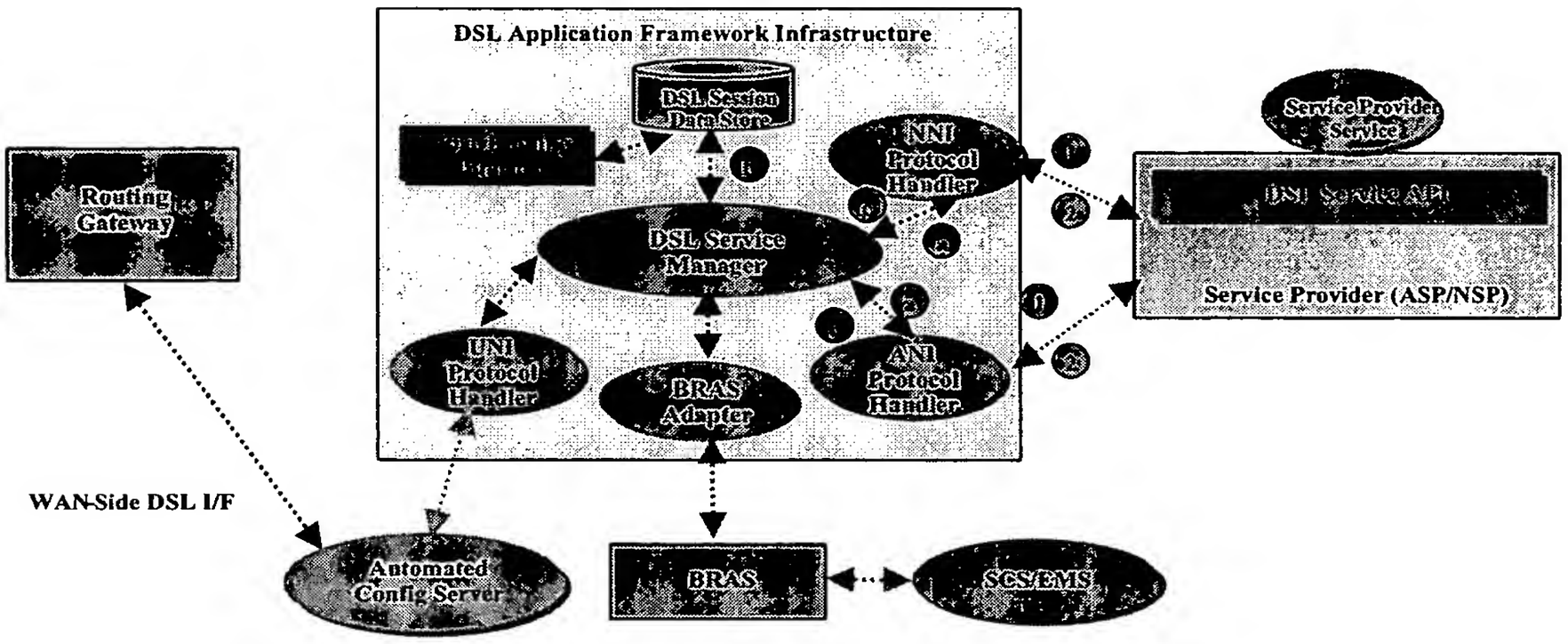


FIGURE 21

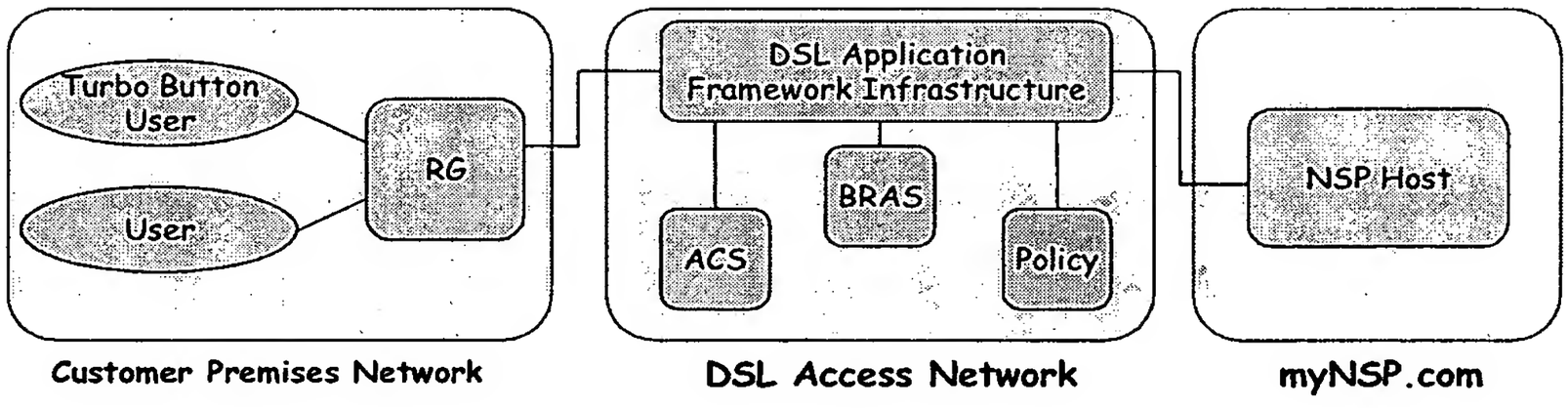


FIGURE 22

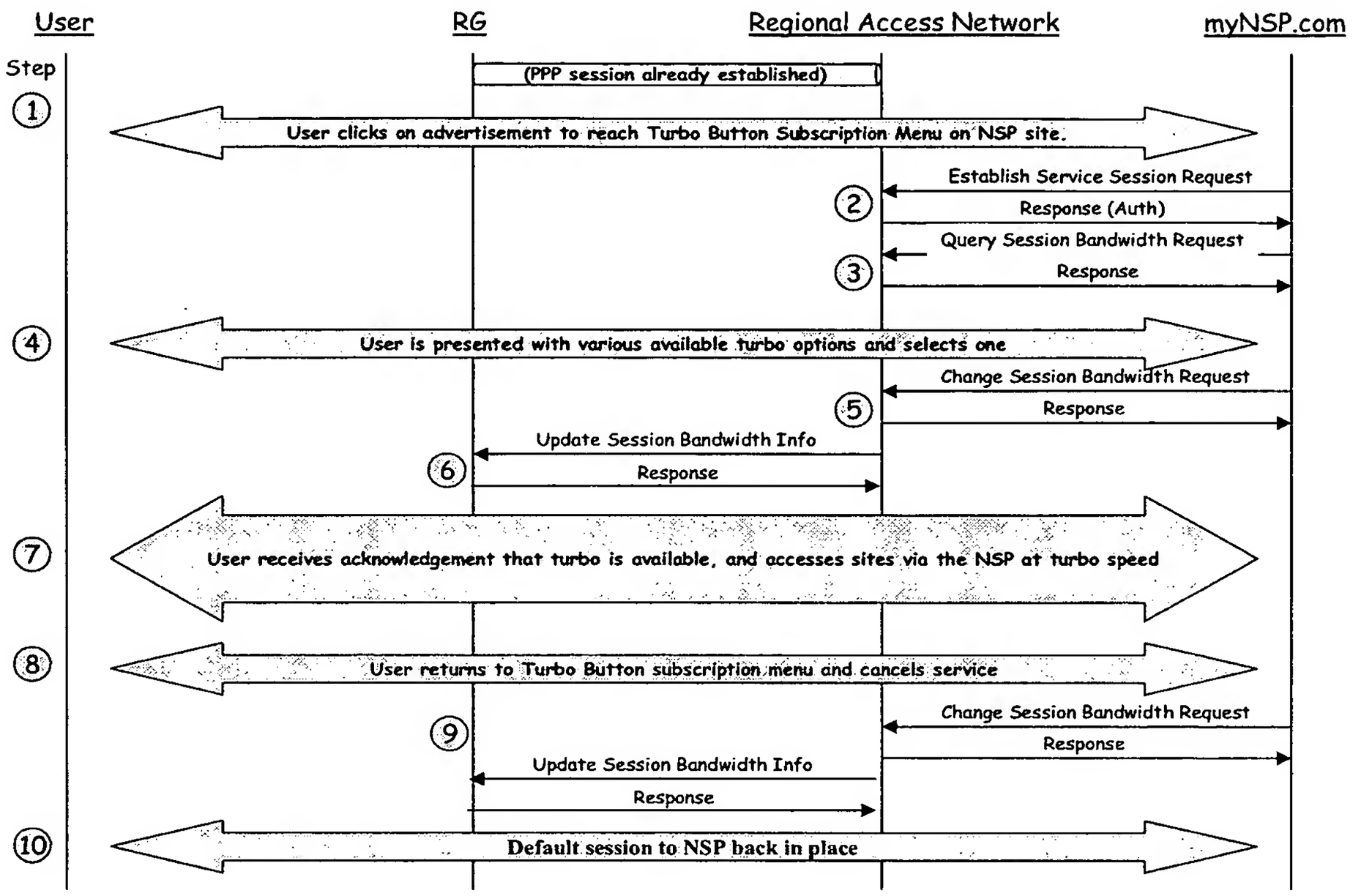

User
RG
Regional Access Network
myNSP.com
Step
(PPP session already established)
1
User clicks on advertisement to reach Turbo Button Subscription Menu on NSP site.
Establish Service Session Request
2
Response (Auth)
Query Session Bandwidth Request
3
Response
4
User is presented with various available turbo options and selects one
Change Session Bandwidth Request
5
Response
Update Session Bandwidth Info
6
Response
7
User receives acknowledgement that turbo is available, and accesses sites via the NSP at turbo speed
8
User returns to Turbo Button subscription menu and cancels service
Change Session Bandwidth Request
9
Response
Update Session Bandwidth Info
Response
10
Default session to NSP back in place

FIGURE 23

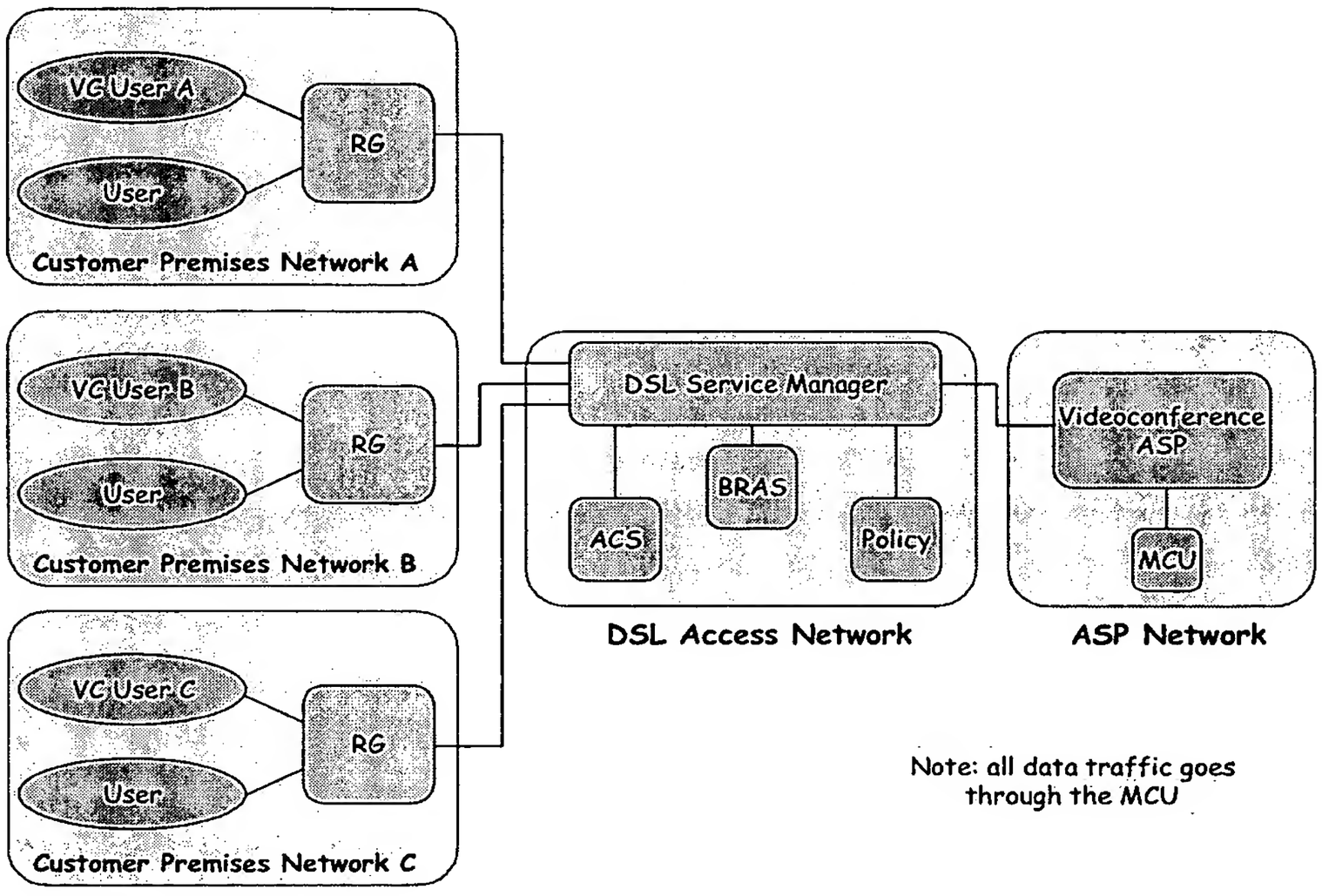

VC User A
User
RG
Customer Premises Network A
VC User B
User
RG
Customer Premises Network B
VC User C
User
RG
Customer Premises Network C
DSL Service Manager
ACS
BRAS
Policy
DSL Access Network
Videoconference ASP
MCU
ASP Network
Note: all data traffic goes through the MCU

FIGURE 24

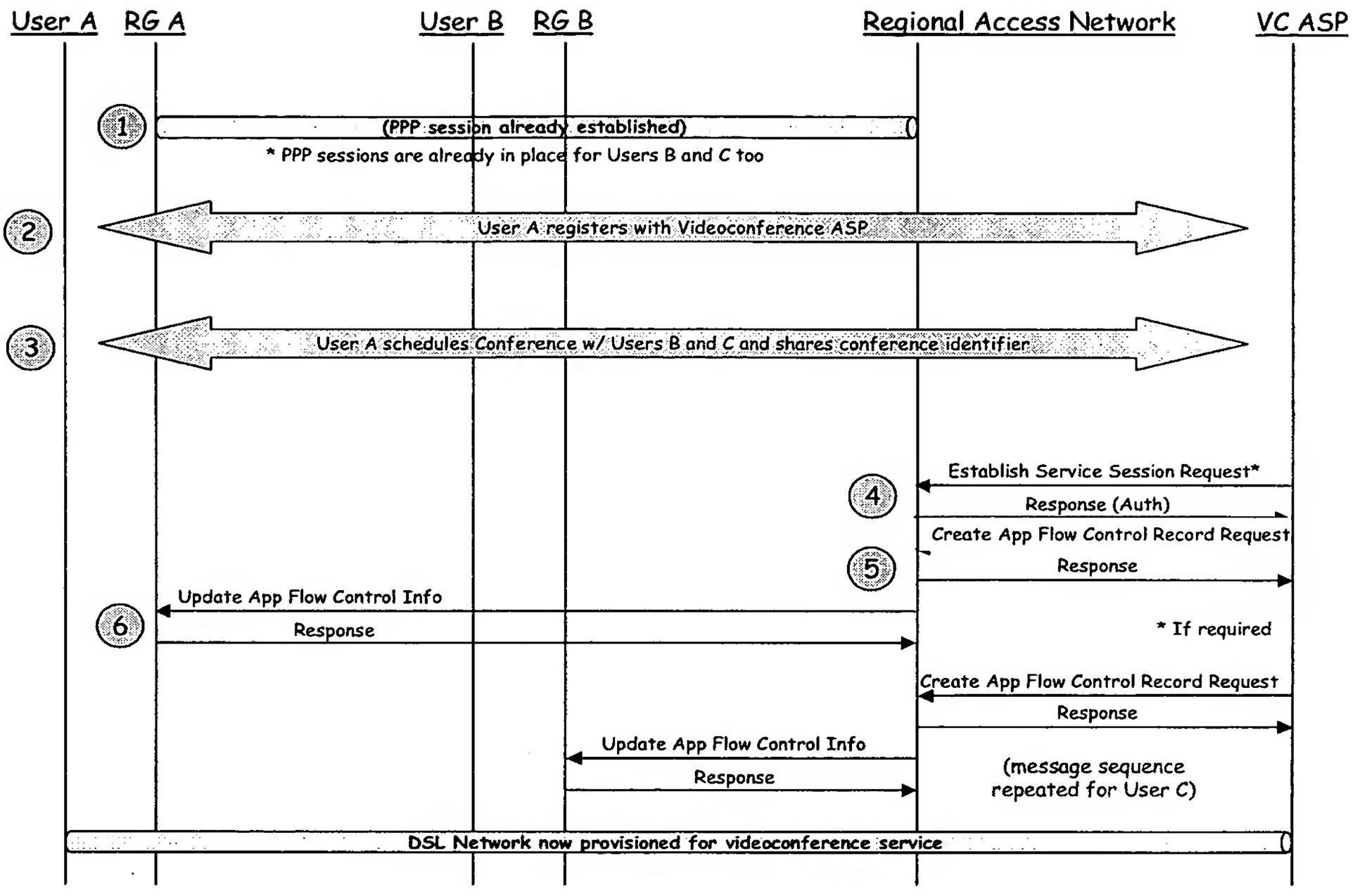

User A
RG A
User B
RG B
Regional Access Network
VC ASP
1
(PPP session already established)
* PPP sessions are already in place for Users B and C too
2
User A registers with Videoconference ASP
3
User A schedules Conference w/ Users B and C and shares conference identifier
Establish Service Session Request*
4
Response (Auth)
Create App Flow Control Record Request
5
Response
Update App Flow Control Info
6
Response
* If required
Create App Flow Control Record Request
Response
Update App Flow Control Info
Response
(message sequence repeated for User C)
DSL Network now provisioned for videoconference service

FIGURE 25

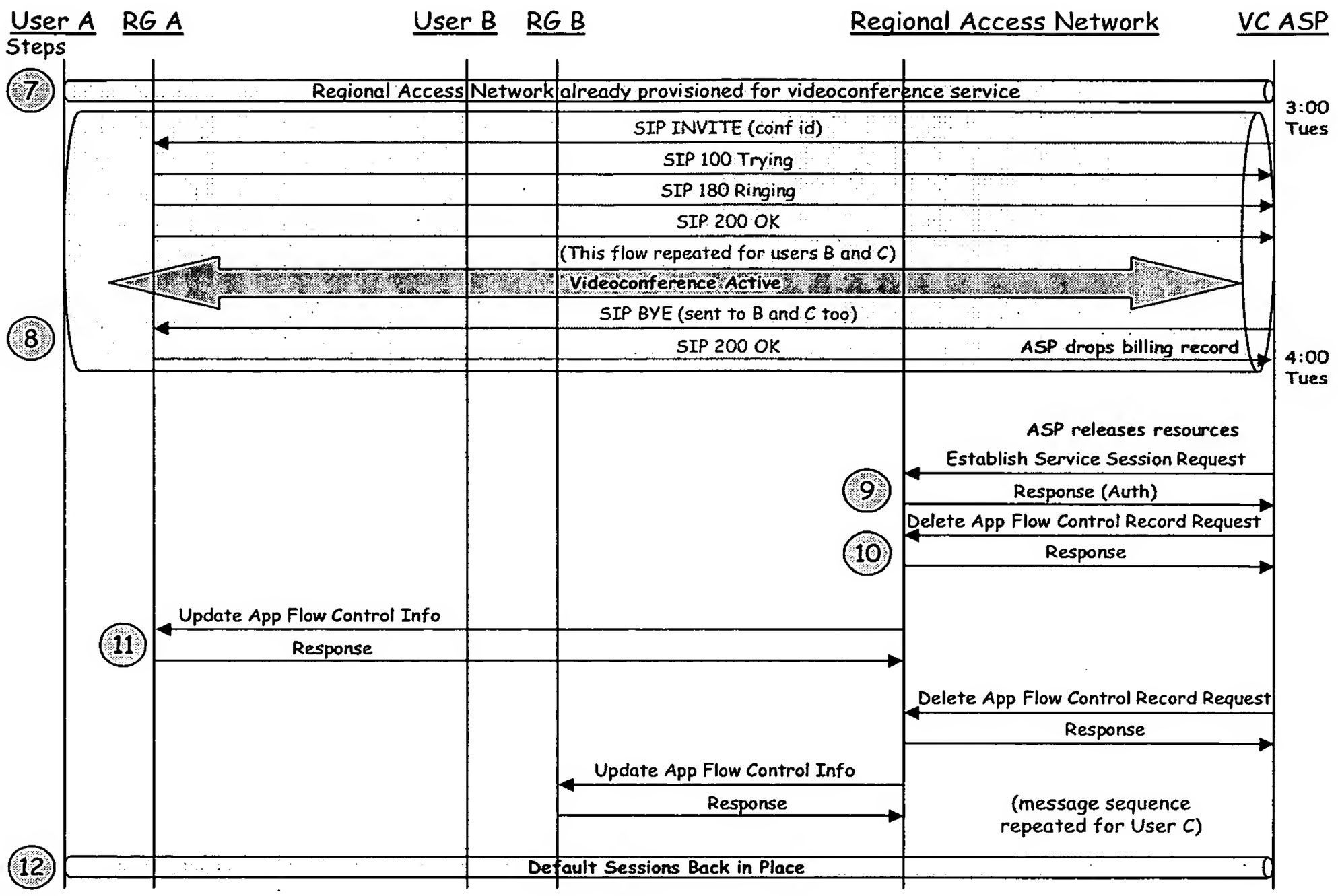

User A
RG A
User B
RG B
Regional Access Network
VC ASP
Steps
7
Regional Access Network already provisioned for videoconference service
3:00 Tues
SIP INVITE (conf id)
SIP 100 Trying
SIP 180 Ringing
SIP 200 OK
(This flow repeated for users B and C)
Videoconference Active
SIP BYE (sent to B and C too)
8
SIP 200 OK
ASP drops billing record
4:00 Tues
ASP releases resources
Establish Service Session Request
9
Response (Auth)
Delete App Flow Control Record Request
10
Response
Update App Flow Control Info
11
Response
Delete App Flow Control Record Request
Response
Update App Flow Control Info
Response
(message sequence repeated for User C)
12
Default Sessions Back in Place

FIGURE 26

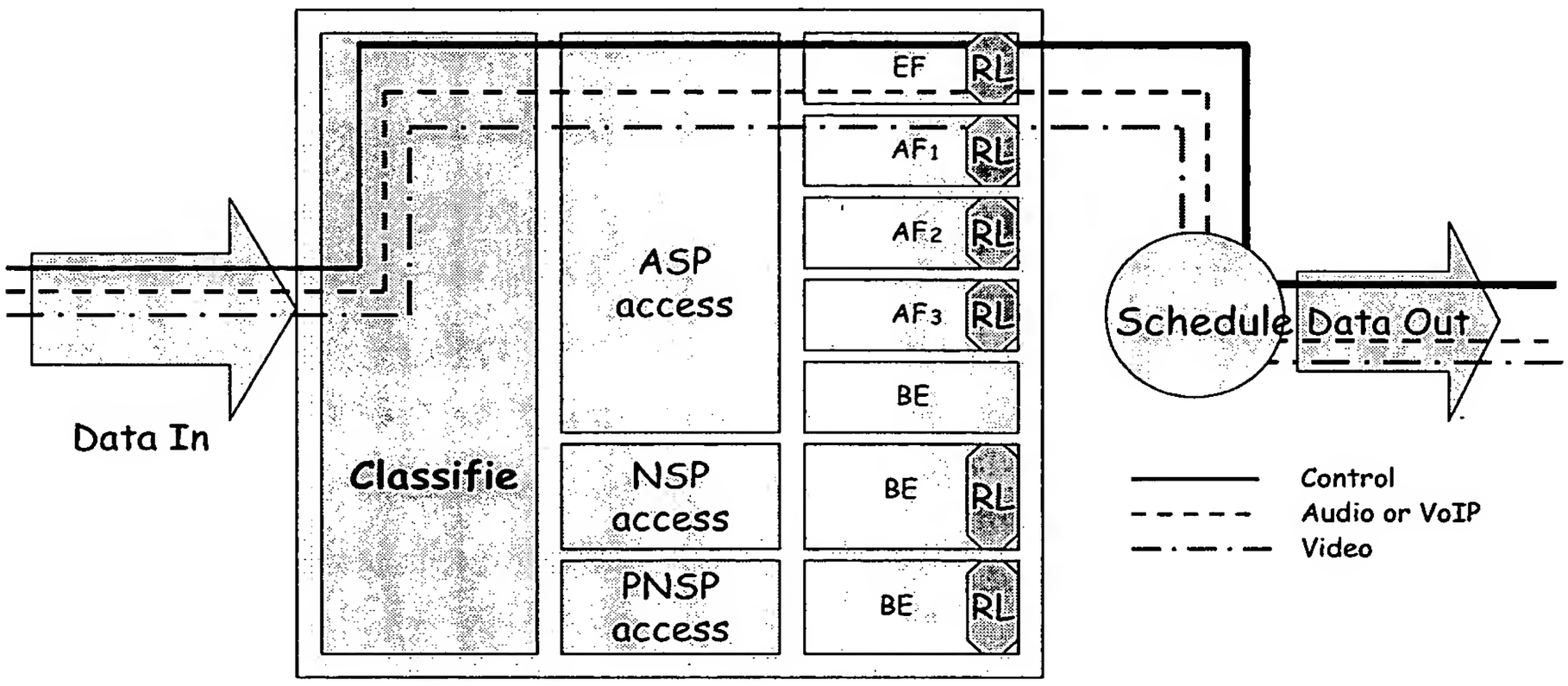

Data In
Classifie
ASP access
NSP access
PNSP access
EF
AF1
AF2
AF3
BE
BE
BE
RL
Schedule
Data Out
Control
Audio or VoIP
Video

FIGURE 27

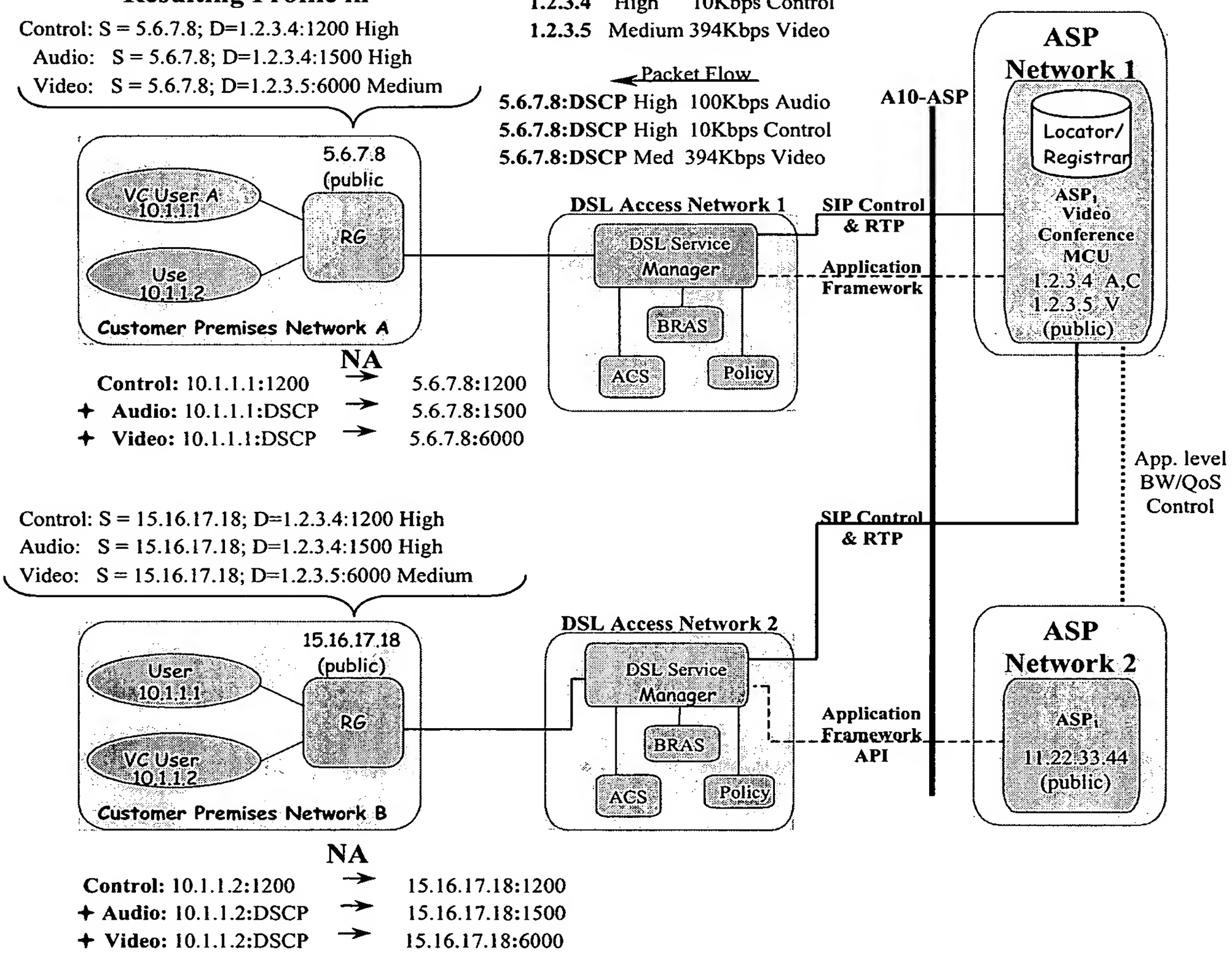
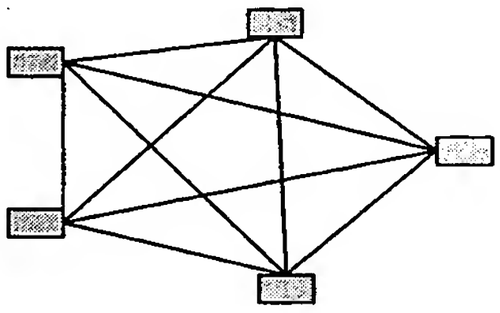
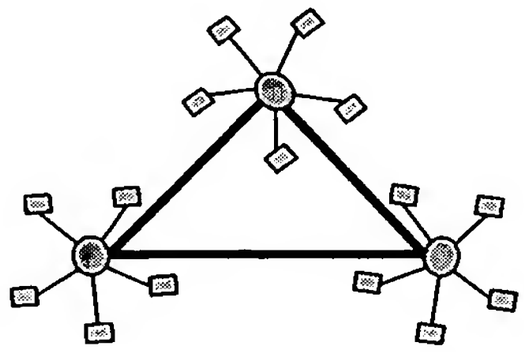

Resulting Profile in
Control: S = 5.6.7.8; D=1.2.3.4:1200 High
Audio: S = 5.6.7.8; D=1.2.3.4:1500 High
Video: S = 5.6.7.8; D=1.2.3.5:6000 Medium
BRAS Classification
Packet Flow
1.2.3.4 High 100Kbps Audio
1.2.3.4 High 10Kbps Control
1.2.3.5 Medium 394Kbps Video
Packet Flow
5.6.7.8:DSCP High 100Kbps Audio
5.6.7.8:DSCP High 10Kbps Control
5.6.7.8:DSCP Med 394Kbps Video
A10-ASP
ASP
Network 1
Locator/
Registrar
ASP1
Video
Conference
MCU
1.2.3.4 A,C
1.2.3.5 V
(public)
5.6.7.8
(public
VC User A
10.1.1.1
Use
10.1.1.2
RG
Customer Premises Network A
DSL Access Network 1
DSL Service
Manager
BRAS
ACS
Policy
SIP Control
& RTP
Application
Framework
NA
Control: 10.1.1.1:1200 → 5.6.7.8:1200
+ Audio: 10.1.1.1:DSCP → 5.6.7.8:1500
+ Video: 10.1.1.1:DSCP → 5.6.7.8:6000
App. level
BW/QoS
Control
Control: S = 15.16.17.18; D=1.2.3.4:1200 High
Audio: S = 15.16.17.18; D=1.2.3.4:1500 High
Video: S = 15.16.17.18; D=1.2.3.5:6000 Medium
SIP Control
& RTP
DSL Access Network 2
15.16.17.18
(public)
User
10.1.1.1
VC User
10.1.1.2
RG
Customer Premises Network B
DSL Service
Manager
BRAS
ACS
Policy
Application
Framework
API
ASP
Network 2
ASP1
11.22.33.44
(public)
NA
Control: 10.1.1.2:1200 → 15.16.17.18:1200
+ Audio: 10.1.1.2:DSCP → 15.16.17.18:1500
+ Video: 10.1.1.2:DSCP → 15.16.17.18:6000

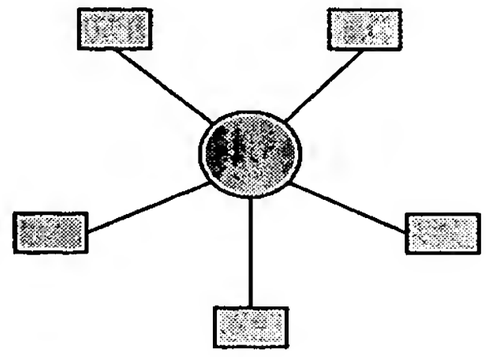
FIGURE 28



Point to Point



Hierarchical Client Server



Client Server

FIGURE 29

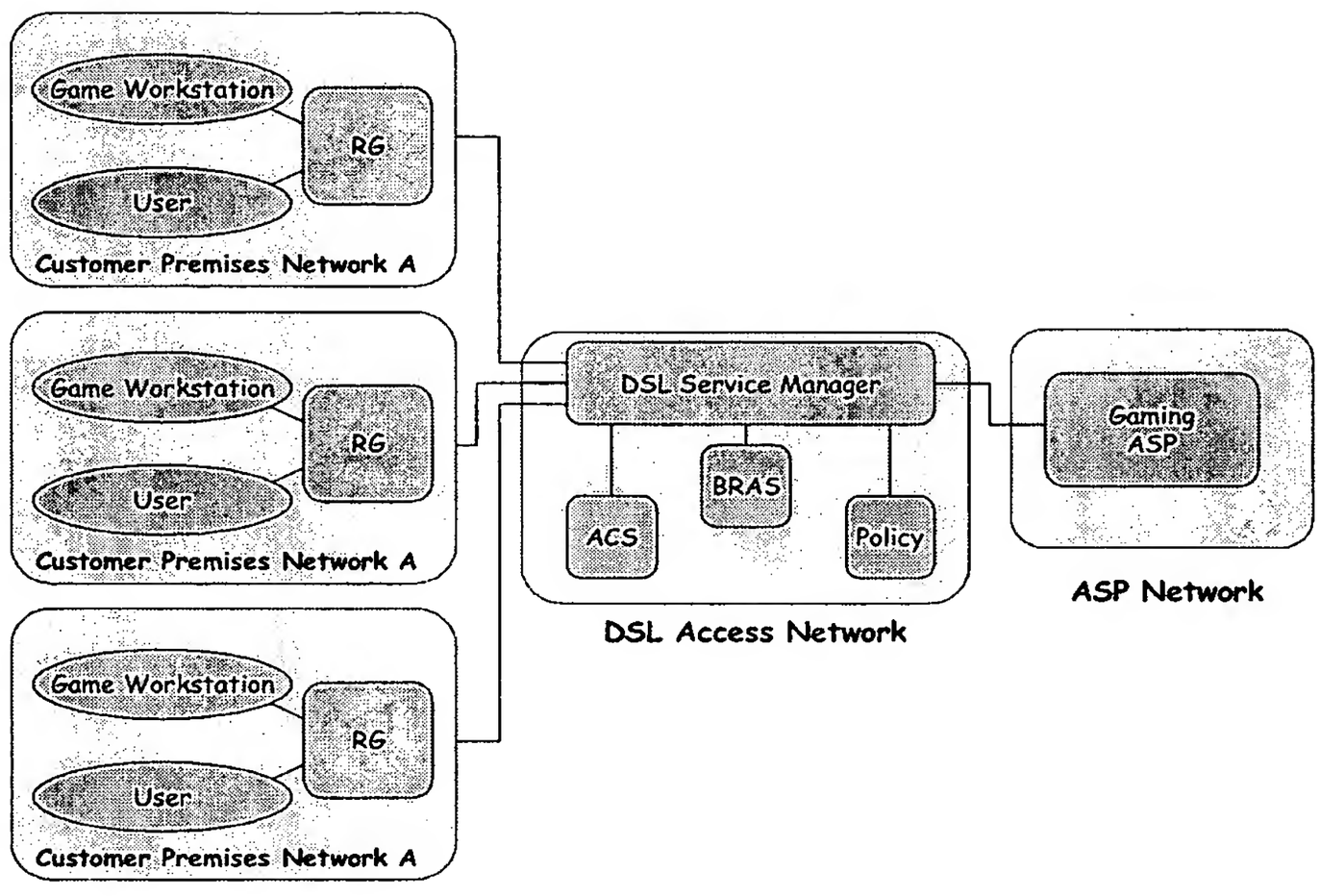

Game Workstation
RG
User
Customer Premises Network A
Game Workstation
RG
User
Customer Premises Network A
Game Workstation
RG
User
Customer Premises Network A
DSL Service Manager
BRAS
ACS
Policy
DSL Access Network
Gaming ASP
ASP Network

FIGURE 30

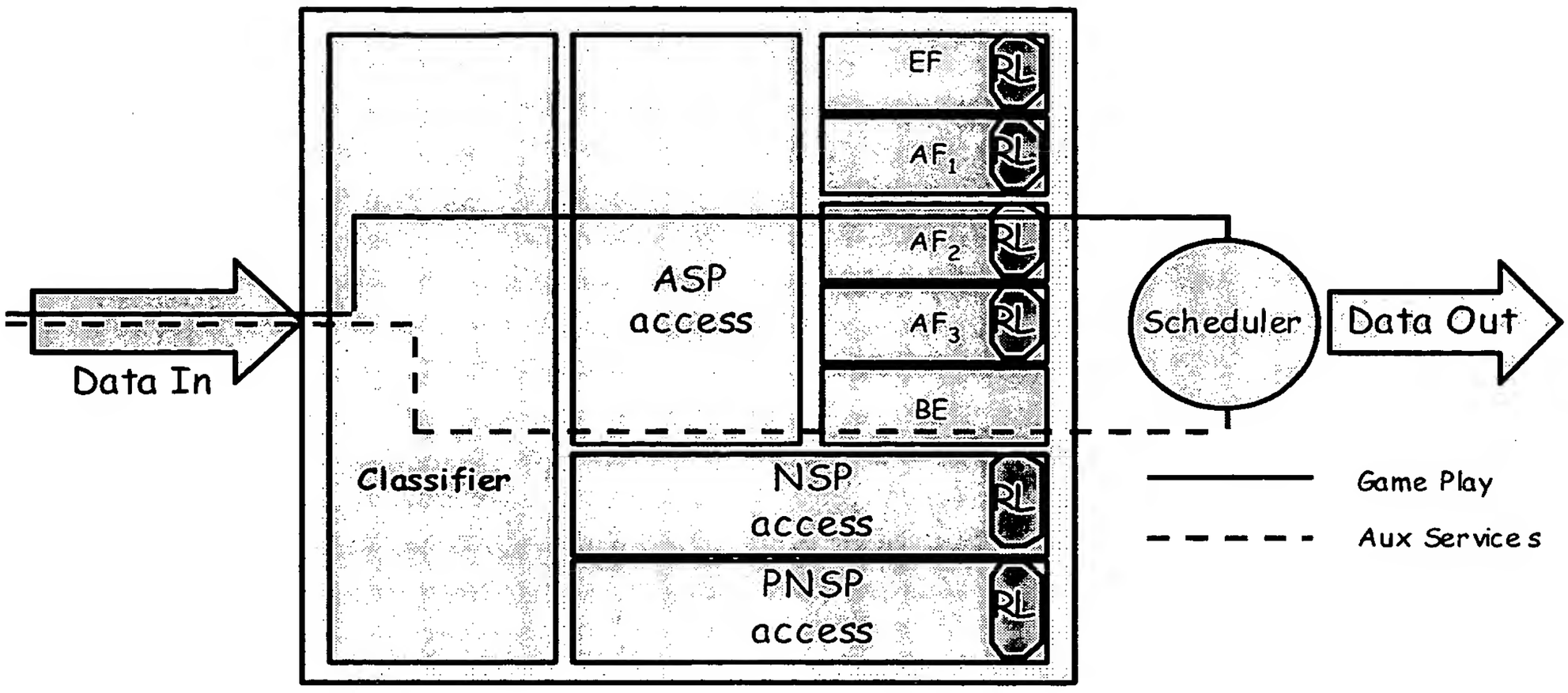
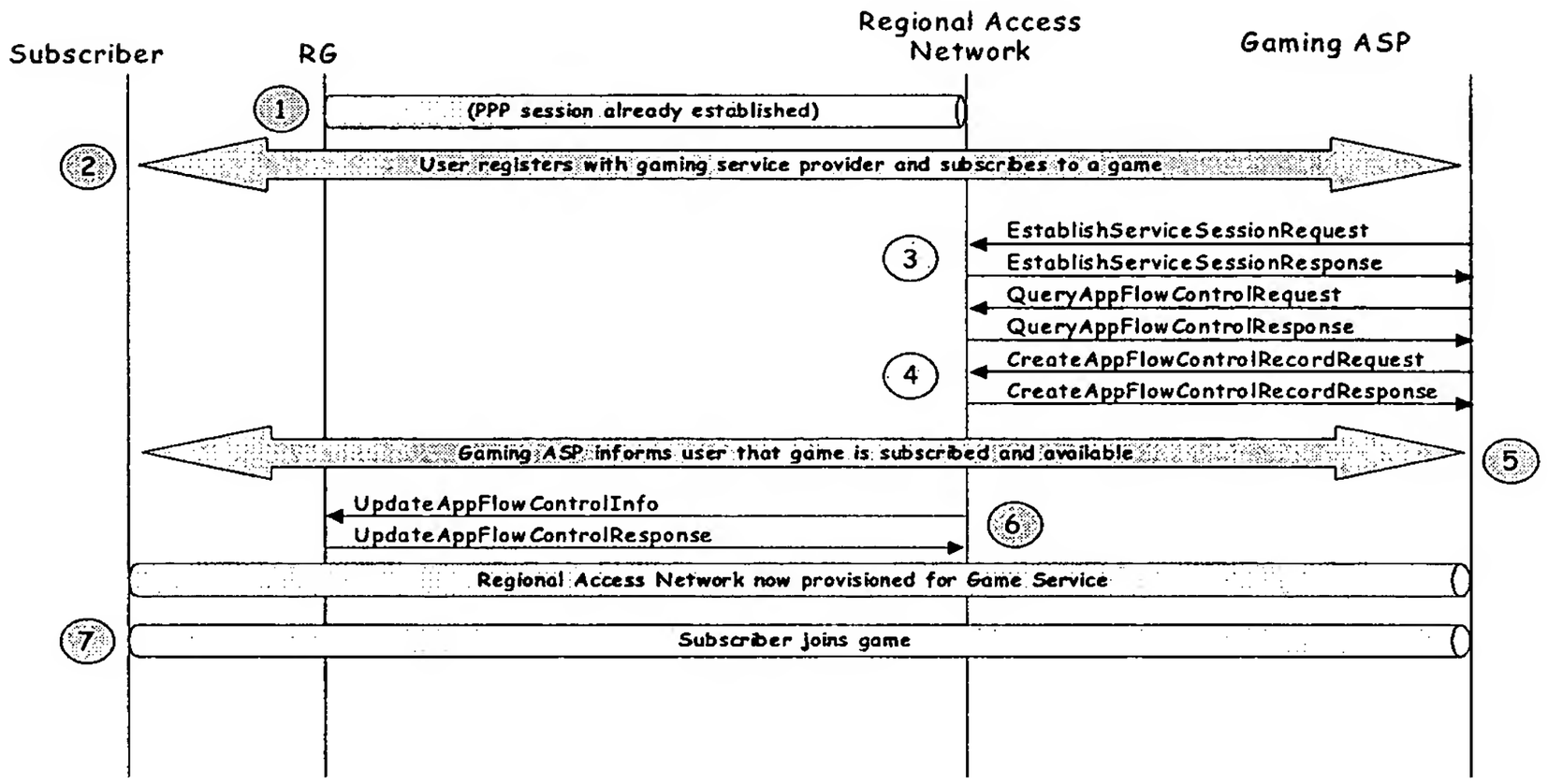

EF
RL
AF1
AF2
AF3
BE
ASP
access
Scheduler
Data Out
Data In
Classifier
NSP
access
PNSP
access
Game Play
Aux Services

FIGURE 31


Subscriber
RG
Regional Access Network
Gaming ASP
1
(PPP session already established)
2
User registers with gaming service provider and subscribes to a game
3
EstablishServiceSessionRequest
EstablishServiceSessionResponse
QueryAppFlowControlRequest
QueryAppFlowControlResponse
4
CreateAppFlowControlRecordRequest
CreateAppFlowControlRecordResponse
Gaming ASP informs user that game is subscribed and available
5
UpdateAppFlowControlInfo
UpdateAppFlowControlResponse
6
Regional Access Network now provisioned for Game Service
7
Subscriber joins game

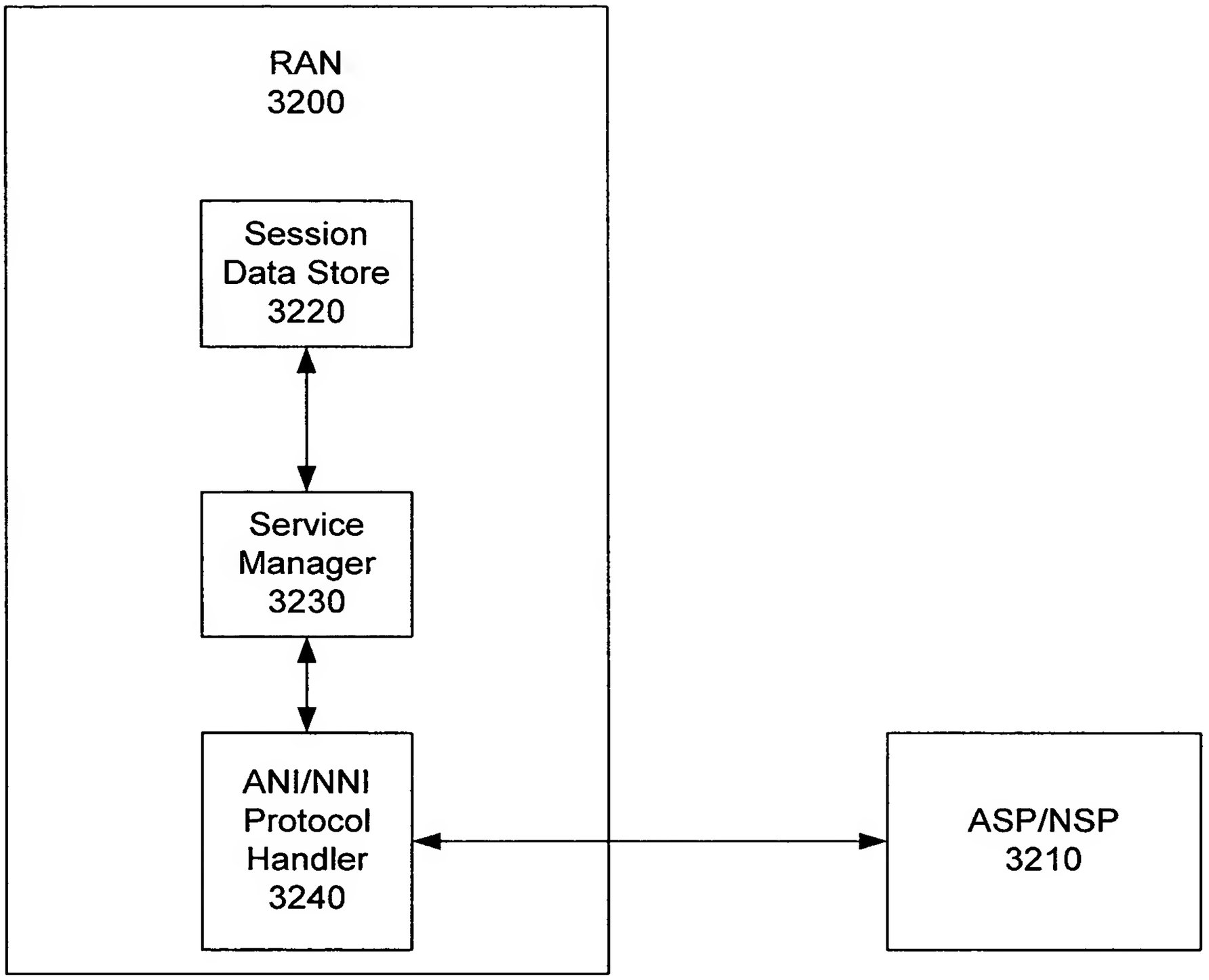

RAN
3200
Session
Data Store
3220
Service
Manager
3230
ANI/NNI
Protocol
Handler
3240
ASP/NSP
3210

Figure 32

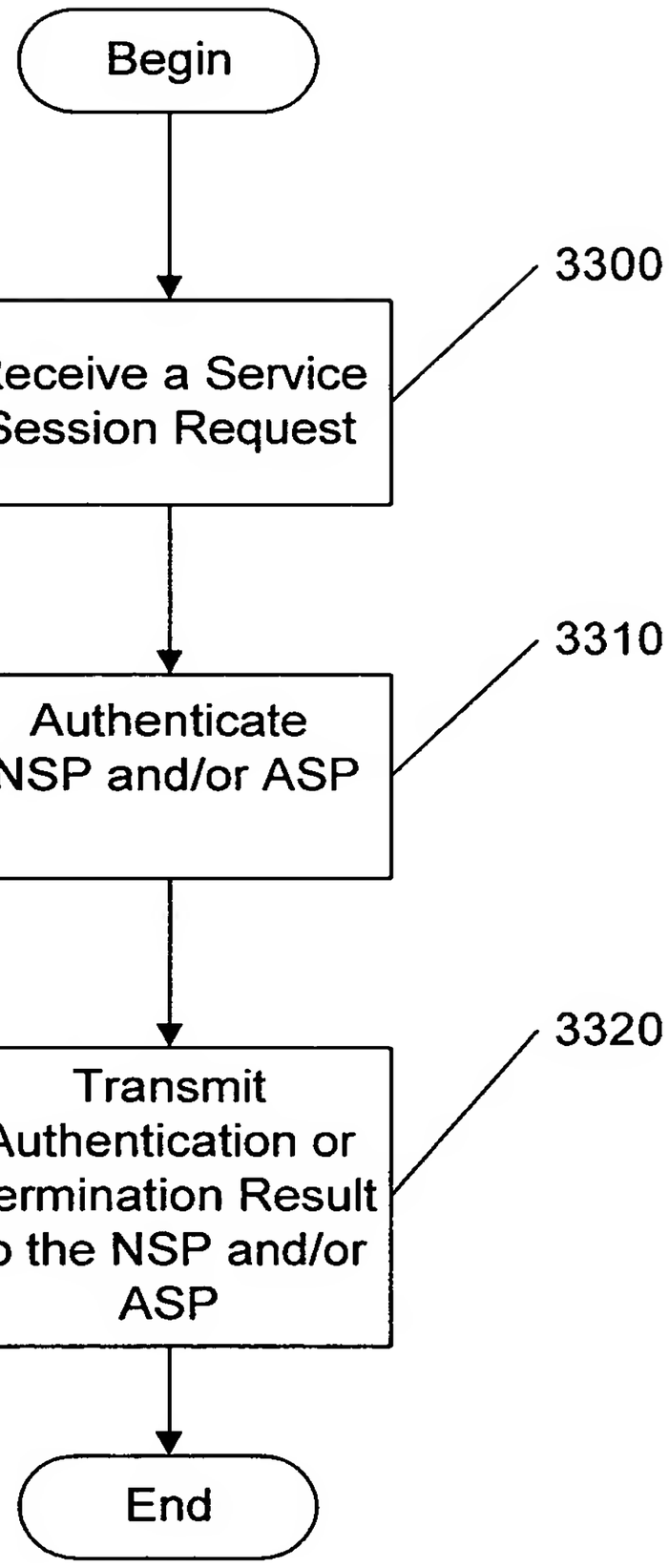

Begin
3300
Receive a Service Session Request
3310
Authenticate NSP and/or ASP
3320
Transmit Authentication or Termination Result to the NSP and/or ASP
End

Figure 33

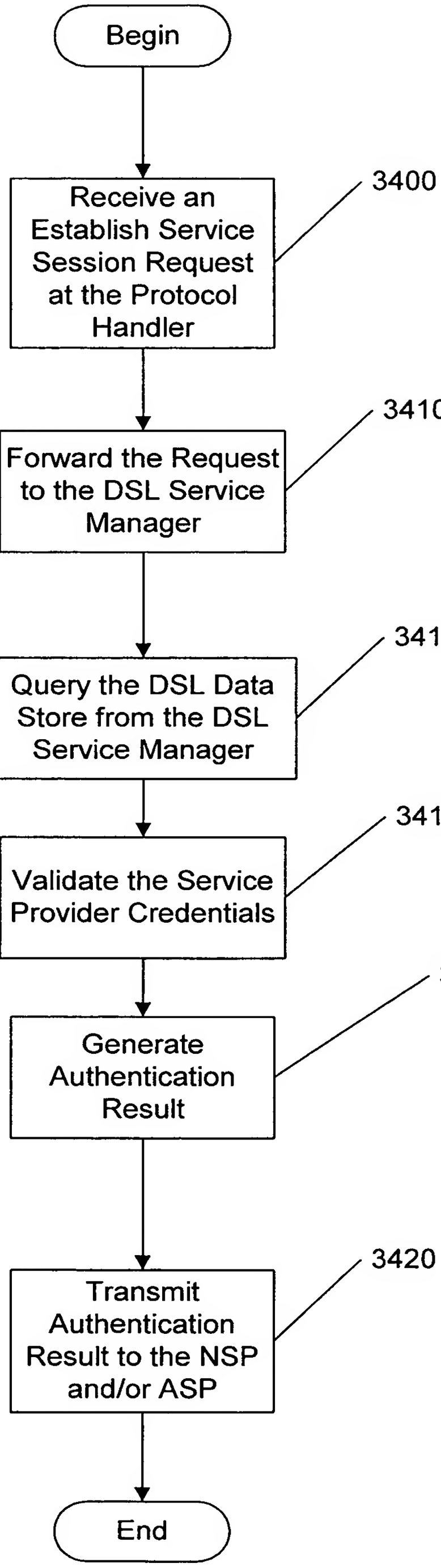

Begin
Receive an Establish Service Session Request at the Protocol Handler
3400
Forward the Request to the DSL Service Manager
3410
Query the DSL Data Store from the DSL Service Manager
3413
Validate the Service Provider Credentials
3415
Generate Authentication Result
3417
Transmit Authentication Result to the NSP and/or ASP
3420
End

Figure 34

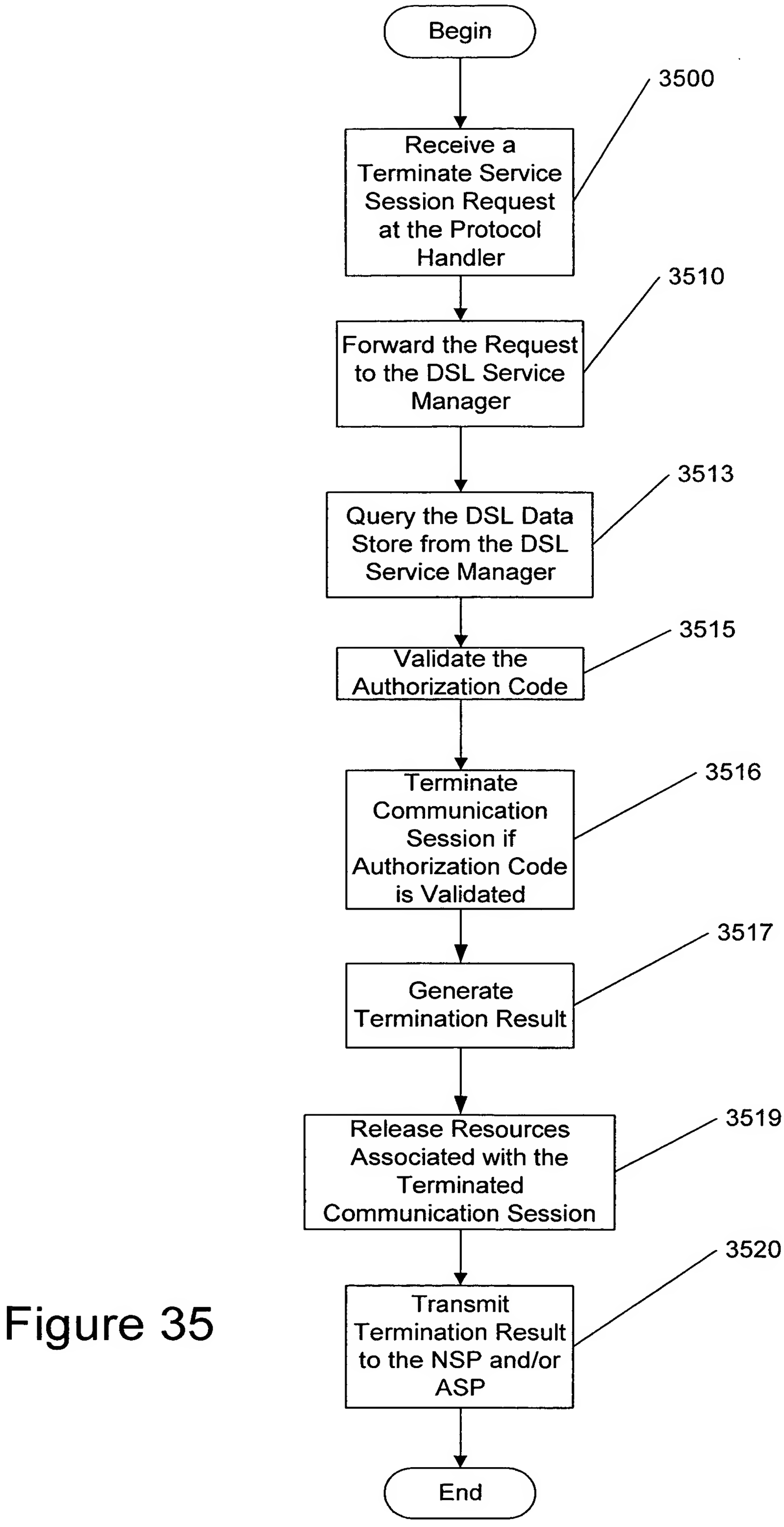

Begin
Receive a Terminate Service Session Request at the Protocol Handler
3500
Forward the Request to the DSL Service Manager
3510
Query the DSL Data Store from the DSL Service Manager
3513
Validate the Authorization Code
3515
Terminate Communication Session if Authorization Code is Validated
3516
Generate Termination Result
3517
Release Resources Associated with the Terminated Communication Session
3519
Transmit Termination Result to the NSP and/or ASP
3520
End

Figure 35